THE IRON AGE

New York, April 18, 1929

ESTABLISHED 1855 VOL. 123, No. 16

Drill Bits Faced With Hard Metals

Stellite and Tungsten Carbides (Borium and Blackor) Used in Oil Fields and Cement Industry to Resist Excessive Scour and Abrasion

ABOUT five years ago the well-drilling fraternity in California became interested in the possibility of improving the performance of rock cutting tools by facing them with hard metal. Churn drill bits had been made of high-carbon or alloy steel, sharpened by forging, and hardened by quenching and drawing. It was apparent that, if a worn edge could be rebuilt by fusion welding, there would be little or no wastage in tool steel, that desired toughness in the bit need not be sacrificed to hardenability, and that exact heat (impossible in portable forges) would be unnecessary.

According to Haynes Stellite Co., Kokomo, Ind., that organization first developed proper methods for putting a layer of hard alloy on a softer backing. To do this the steel base is first ground clean, and preheated carefully and thoroughly to a dull red heat. An oxy-acetylene flame having a slight excess of acetylene is then directed at a spot until the metal begins to "sweat"; a rod of Stellite has meanwhile been held in the flame and the hot surface is "tinned" completely with a thin layer of the hard metal. A subsequent layer of Stellite is then welded to this prepared surface; the end of the hot rod is kept under the surface of the puddle, and the molten area gradually worked ahead as the necessary thickness is attained, always protecting the puddle with the enveloping flame. Finally the piece is slowly cooled in ashes.

Stellite is an alloy principally of chromium, tungsten and cobalt, intrinsically hard. The hardness of such a prepared surface is approximately equal to 8 (mineralogist's scale, equivalent to scratch hardness of topaz). It is fairly tough, and 3 to 5 times as resistant to abrasion as the best of the older bits. The above mentioned facing process was rapidly adopted for well-drilling tools. Its use has also extended to other industries, especially cement manufacture. Conveyor flights, bearings, and spouts in contact with hot clinker have their life prolonged indefinitely by a Stellite coating. The facings have also been applied successfully to metal working dies, swing hammer crushers, and other parts.

Other Hard Alloys

Stoody Co. of Whittier, Cal., soon brought a competing alloy into the market called Stoodite, a hard chromium-iron alloy with some manganese.* It has a hardness between 7 and 8 (i. e., will scratch quartz but not topaz). Other proprietary alloys now being exploited for similar purposes and welded on by similar methods are called

* "Increasing the Footage Drilled per Bit by Use of Hard Facing Alloys," by A. E. Place, mining engineer, Los Angeles, in *Engineering and Mining Journal*, March 23, page 486.

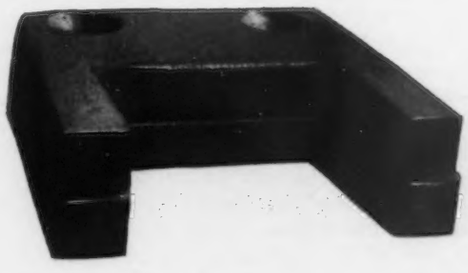


Fig. 1—Comparative Appearance of Wearing Edges, of Flying Shear Knives. Top One Is Hardened Chrome-Vanadium Steel After Cutting Six Heats; the Lower One Stellited Machine Steel After Cutting 50 Heats

Fig. 2—Rotary Drilling Bit, Mounted with Borium, After Running 856 Feet. Hard particles retain position and softer steel between gouged out by abrasion of rock particles

Spartanrod and Diamondface (mainly iron and tungsten) and Plmite (an alloy of iron, chromium and tungsten).

An entirely different class of hard inset materials is represented by "Borium." C. L. McCorkindale of the Stoody Co. is authority for the statement that W. F. Stoody and S. M. Stoody originated this, the first of the diamond substitutes, in 1927. Borium has a hardness between 9 and 10 (will scratch corundum or sapphire but will not scratch a diamond). It is tough enough to withstand shocks of drilling operations and in Mr. McCorkindale's opinion marks an advance over the above mentioned hard facing metals, at least as far as rock drilling tools

Fig. 3—Core Drill, Mounted with Borium, After Cutting 120 Feet

Fig. 5—Bit Shown in Fig. 4 After Digging 1,115 Feet of 15-Inch Hole

are concerned. By its use from 5 to 20 times the amount of hole may be drilled as with hardened steel.

"Borium is sold either in pea size (small irregularly shaped pieces that run through a 3/16-in. screen but remain on a ¼-in. screen), or as 'tube borium'—the same inclosed in a 5/16-in. cylindrical jacket of mild steel in varying lengths to suit the requirements of the user.

"Application is always carried out with the acetylene torch. In applying pea size Borium, the pieces are set on the cutting edges of the bit with a high carbon rod. After this, Stoodite is applied as a surfacing metal to hold the particles in place.

"Tube borium is placed along the edge to be covered, and the torch is played directly on the tube. The mild steel melts and cements the Borium to the bit, after which it is ready for the hard metal facing. In all applications, the flame of the torch should have 'ragged' edges (that is, a flame with an excess of acetylene), and the bit warmed to a red heat at the point where the Borium is to be run. The electric arc should not be used, as it will slowly oxidize the material."

The illustrations show the appearance of rotary tools after hard usage. The hard particles remain in place even after the scour of rock particles has cut deep channels between them. In addition to Borium, several other diamond substitutes have been placed on the market. Among them are Hastellite, Thoran, Titan, Sulamite, Diamonet, Duridium, Tungsite, Vulcanite, Anglite and Redor. While they are all made by "secret" processes, it is probable that the principal material is tungsten or molybdenum carbide.

A third class of facing material, which covers the

Fig. 4—Blackor Powder Scattered Over Wing of Six-Way Bit, Preparatory to Fusing in with Carbon Arc. Opposite wing shows appearance of completed weld

entire cutting edge and yet is said to be as hard as the above-mentioned insert particles, is known as "Blackor," recently developed by Blackor Co., Los Angeles. Its properties and method of application have been described by A. E. Place. "It is a tungsten carbide alloy marketed as black granules, which crumbles between the fingers and breaks down in water to a black fine powder. It does not melt in the acetylene torch and has to be applied with the carbon electric arc. It has a hardness ranging from 8.6 to 9.2 (about equal to corundum or sapphire), according to the amount of intermelt allowed by the welder between the base and the hard-facing metal, and the number of coats applied. Due allowance must therefore be made for the skill of the welder. Too much facing metal makes for brittleness."

In Mr. Place's opinion, insert particles such as Borium are held in place either by a slight cementing or alloying effect, or by the shrinkage of the overlapping surfacing metal. "Unless great care is taken in the welding operation, cracking of the bonding material may occur, and the insert grains will be lost during drilling." Channeling of the bit is therefore avoided by the use of hard-facing material like Blackor, since it covers the entire edge. He cites as a comparative test two parallel wells, one drilled 2071 ft, with two faced bits costing $150; the other required 15 sets of hardened steel disk bits costing $1,350.

Such materials also have distinct possibilities for metal cutting tools. The Vanadium-Alloys Steel Co., Latrobe, Pa., has conducted tests on lathe tools pointed with Borium (see THE IRON AGE, Feb. 7, page 429).

Testing Compressed Gas Cylinders

Volume Expansion Measured at Two Pressures Determines Wall Thickness and Ductility—Curve-Drawing Machine Records Data for Each Cylinder

BY GLEN D. BAGLEY*

CYLINDERS represent a large part of the invested capital of the compressed gas industry, and consequently means must be devised to determine their condition, not only at purchase but at any time thereafter. The walls must be thick enough to withstand the maximum working pressure safely, yet thin enough to avoid excessive freight charges. The elastic limit must be high enough to prevent excessive stretch during proof test, and low enough to insure maximum ductility and insurance against rough handling.

The past records of the extremely large number of high-pressure gas cylinders in the United States have shown such a small number of failures as to indicate that these desirable qualities must have been achieved. However, the consequence of a single cylinder failure may be so serious that it is pertinent to inquire whether anything more can be done still further to safeguard production and use.

GLEN D. BAGLEY

Whose Extended Researches on Cylinders for Compressed Oxygen Indicate That Present Acceptance Tests Can Be Improved

Government Specifies the Test

Practically all cylinders have been made under Interstate Commerce Commission regulations; the principal features are:

Every new cylinder must withstand a test pressure equal to 1⅔ times the charging pressure at 70 deg. Fahr., with a permanent expansion not greater than 10 per cent of the total, and without any previous pressure greater than one-third of the test pressure having been applied. In addition, one cylinder from each 200 must stand a crushing test to six times the wall thickness without cracking. Tensile test specimens from this cylinder must show an elongation of not less than 10 per cent in 8 in., with an elastic limit less than 70 per cent of the ultimate strength.

A fair criticism of a hydraulic test made under these conditions is that, while it shows that the wall stress is not greater or only very slightly greater than the elastic limit of the steel, it does not give any information regarding the value of the stress in the wall. A thin-walled cylinder with a high elastic limit would pass the test equally well with a thicker cylinder which had a lower elastic limit.

To develop additional tests which would give more information with regard to each cylinder made without harming it, a number of cylinders were studied up to large overpressures. Subsequently, the cylinders were burst under hydraulic pressure, tensile test specimens were cut from their walls, the hardness of the steel was determined and the microstructure was studied.

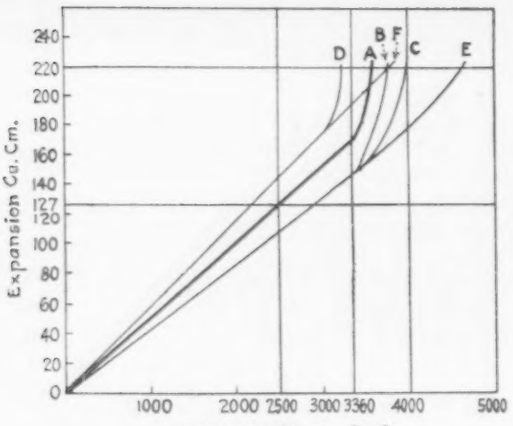
When this work was completed, it was found that the curves showing the relation between pressure and volume told a great deal. These curves (Fig. 1) turned out to be practically straight lines up to the elastic limit (or the point at which permanent expansion takes place). Beyond this pressure, the curves are of different shape, depending upon the hardness of the steel. Curves for the softer cylinders show a relatively sharp break; the cylinders expand rapidly when the elastic limit is passed. The harder cylinders act in an elastic manner until a higher pressure is reached, and have a more gradual expansion after it has been passed. The slope of the straight part of the curve indicates the average wall thickness of the cylinder, because a thinner wall will show a greater elastic expansion at a given pressure than a heavier cylinder.

While such curves give a complete story regarding both the wall thickness and the condition of the steel, the determinations are tedious and impracticable for commercial acceptance work. Fortunately, since the wall thickness is indicated by the slope of the straight part of the curve, a single determination may be used; it was found convenient to use 2500 lb. per sq. in. for oxygen cylinders (commercially charged with 220 cu. ft. of oxygen compressed to 2015 lb. at 70 deg. Fahr.). A cylinder having the thinnest wall acceptable would have an elastic expansion at this pressure of 127 cc. The heavy line in Fig. 1 indicates the slope of the elastic curve from such a cylinder. Any cylinder too thin, such as represented by curves D and F, would give a larger expansion than 127 cc. at 2500 lb. per sq. in. pressure and would be rejected.

So much for the determination of proper wall thickness. There yet remains the question of proper elastic limit. A study of the upper portions of the curves shown in Fig. 1 showed that those cylinders represented by curves A, B and C possess the desirable qualities of sufficient wall thickness combined with an elastic limit sufficiently high to resist excessive stretch at the Interstate Commerce Commission's test pressure and at the same time retain the maximum possible ductility. A cylinder producing a curve such as E, showing a very gradual bend, indicates an unnecessarily high elastic limit; this gives the steel a greater tensile strength than is required at the sacrifice of desirable ductility.

Curve D has a desirable elastic limit but insufficient thickness. If the thickness had been above the specified

*Union Carbide & Carbon Research Laboratories, Inc., Long Island City, N. Y. Excerpts from a paper read before the Compressed Gas Manufacturers Association.



A. Hardness Acceptable Thickness Minimum.
B. Hardness Acceptable Thickness Average.
C. Hardness Maximum Thickness Average.
D. Hardness Acceptable Too Thin.
E. Too Hard Thickness Acceptable.
F. Too Hard Too Thin.

Fig. 1. Pressure-Expansion Curves for Characteristic Cylinders During Acceptance Tests

minimum, the bent portion of the curve would have fallen among the curves A, B and C.

Curve F is from a cylinder which is not only too thin but also has too high an elastic limit. This cylinder is of the most undesirable type, since it possesses low ductility combined with high wall stress. Both this cylinder, as well as cylinder E (which is also undesirable on the basis of low ductility, although not on the basis of high wall stress), would be acceptable under the present Interstate Commerce Commission test. Cylinder D would be rejected, as it properly should be, while cylinders A, B and C, the desirable ones, would be accepted.

Information Given by Two Readings

By means of these curves, a complete specification for an hydraulic acceptance test on 220-cu. ft. oxygen cylinders can be stated as follows: At 2500 lb. per sq. in., the elastic expansion must be not greater than 127 cc. and the total expansion must reach a value of 220 cc. between the pressures of 3360 and 4000 lb. per sq. in.

Such a test can easily be made by setting the pressure at 2500 lb. per sq. in. and reading the elastic expansion; if it does not exceed 127 cc. the wall thickness of the cylinder is satisfactory. The pressure can then gradually rise until the expansion reaches 220 cc.; if this point is reached between 3360 and 4000 lb. it is then known that the steel in that cylinder has satisfactory ductility.

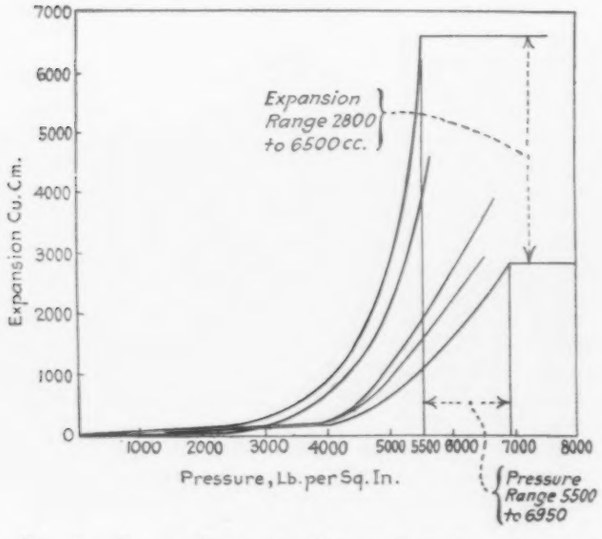


Fig. 2. Pressure-Expansion Curves Carried to Bursting Pressures

While such a test appears to be logical, it does not conform exactly to the present Interstate Commerce Commission regulations. Thus—take a cylinder of minimum wall thickness; it would expand elastically 127 cc. at 2500 lb. pressure and (at the same ratio) 170 cc. at 3360 lb. pressure. But suppose the proportional limit were passed before the higher pressure were reached and the total expansion actually measured 220 cc. at 3360 lb. pressure; the permanent set would then be 220 minus 170, or 50 cc., which is 23 per cent of the total (220). The present limit is 10 per cent.

But does such a permanent expansion harm the cylinder?

A little computation shows that a 10 per cent permanent expansion (say 22 cc.) in a cylinder whose total volume is 44,000 cc. will cause a permanent set in the metal of the cylinder of 0.02 per cent, assuming that all the stretch takes place in a circumferential direction. Even 50 cc., the greatest permanent expansion possible under the proposed test, would only cause the metal to acquire a set of 0.05 per cent, a fraction so very small that it could not possibly harm the cylinder.

As a matter of fact the first 6 per cent of the permanent expansion under internal pressure is the so-called "rounding-out," and occurs the first time pressure is applied. It is not caused by true stretch in the steel, since experience has shown that it is necessary to exceed 6 per cent permanent expansion in order to be sure that the true elastic limit has been reached. For commercial reasons, therefore, it would be desirable to increase the allowable permanent expansion limit to 25 per cent of the total at test pressure in order to facilitate the operation of the test. There does not seem to be any valid objection to this increase.

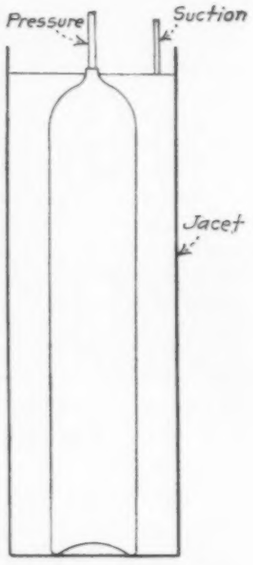


Fig. 3. Diagram of Testing Jacket

To obtain further information on this point, the expansion of several cylinders was measured up to the bursting point in apparatus sketched in Fig. 3. Results obtained with this apparatus are shown in the curves of Fig. 2. Total expansion varied from 2800 to 6500 cc., thus showing that the maximum permanent expansion of 50 cc. encountered in the proposed acceptance test is a negligible percentage of the permanent expansion available, even in the less ductile cylinders. These curves also show how the ductility of a cylinder is decreased as its elastic limit and ultimate strength is increased, since the cylinders which require the higher bursting pressures show less total expansion.

A machine has also been developed which will automatically draw these characteristic curves for each cylinder (Fig. 4). It consists of a corrugated steel pressure element, which operates a drum carrying the sheet of paper on which the curve is drawn. This pressure element is connected in parallel with the cylinder so that the same pressure is applied to it as to the cylinder. The volume element is connected by piping to a vertical tube and float; as the pressure is applied, the float moves the registering point vertically at the same time that the pressure element rotates the drum. This machine provides a permanent record of the characteristics of each cylinder at the time it is purchased.

The second phase of cylinder testing attempts to determine what happens to a cylinder after it is placed in service. Extensive investigations have shown that barring accidental damage to the cylinder in service, the only factor of serious consequence to the life of an initially satisfactory cylinder is internal corrosion. It occurs only occasionally, but it presents no external evidence, and it is highly important to find it by some means.

Internal Corrosion Chief Danger During Use

The elastic expansion of the cylinder, which has been described above as a means of determining the average wall thickness of new cylinders on the acceptance test, can be used for this purpose. No extra measurements are needed, since the present Interstate Commerce Commission regulations require the determination of the total and permanent expansion on each cylinder every five years.

Sometimes it has been found that excessive corrosion can occur in less than the prescribed five-year test period. To safeguard against this possibility, each cylinder is tapped with a light hammer each time it is received at the plant for refilling. Any cylinder which does not ring clear is given a jacket test immediately, regardless of whether it is due for the five-year test. If the elastic expansion is not above the limit, it can be cleaned out and returned to service.

Conclusion

In conclusion, it has been shown that simple non-destructive tests are available which make it possible to determine the wall thickness and condition of the steel on every new cylinder which is placed in service, at the time the cylinder is delivered from the steel mill.

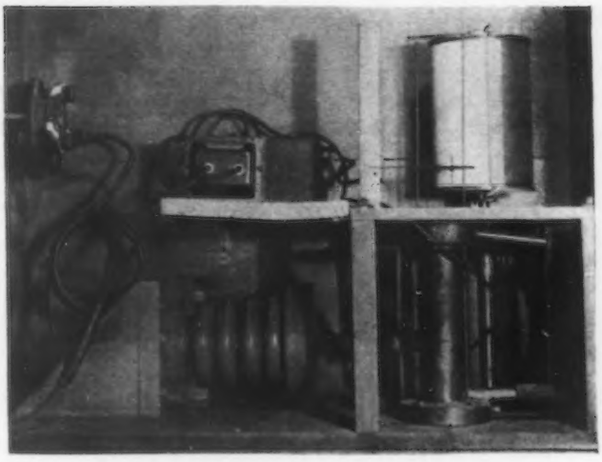


Fig. 4. Autographic Device for Acceptance Tests

In addition, the present five-year test affords data from which the wall thickness of cylinders in service can be determined during life, so they may be discarded before becoming dangerous. Hammer tests give an additional safeguard which can be applied every time the cylinder is refilled.

Steel Frame Fabricated in the Field

FIFTEEN buildings using the all-welded steel arch have recently been built in the Florida fruit-growing districts by Arch Engineering & Construction Co., Orlando, Fla. They range in size from 74-ft. span by 217 ft. long to 117-ft. span by 202 ft. long, the latter requiring about 200 tons of structural steel.

As shown by the view, which represents a fruit packing house built for the Seaboard Airline Railway, the steel arches are made of short lengths of structural channels cut to form an arch when butted end to end. They are then fabricated into one piece by electric arc welding. Entire fabrication is completed on the ground; then the arches are raised into position, anchored to the footing and tied together by channel purlins welded to the arches. No rivets, bolts or screws are used in the fabrication or erection of these buildings (other than anchor bolts for holding the frame down to a concrete foundation) nor is any work done in the shop.

According to information furnished by Lincoln Electric Co., one of these buildings was under construction when the two hurricanes spread disaster in Florida last August and September. In the first hurricane the wind blew down the front and rear masonry walls, but the welded superstructure remained intact and unharmed. The second and more severe hurricane left unharmed this and the several other buildings of the same construction.

Fruit Packing House of Seaboard Airline with Welded Steel Arches

Rolling Bar Plates and Hot Strips

Continuous Mill of Eleven Stands Uses Flywheels on Four Only—Close Speed Regulation Needed in the Others

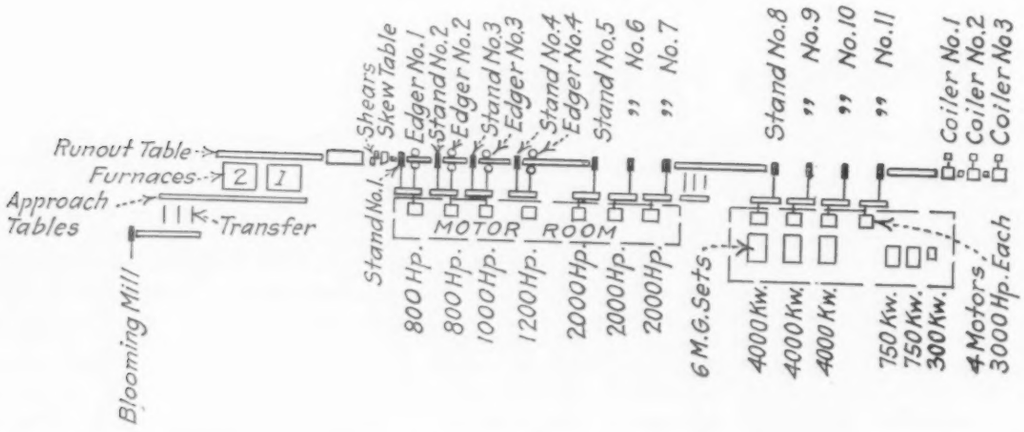
A CONTINUOUS bar plate and hot strip mill recently placed in service by the American Rolling Mill Co. at Middletown, Ohio, was described by J. B. Ink of that company before a Cincinnati meeting of the American Institute of Electrical Engineers. What follows is taken from that paper. The new mill produces ingot iron and various grades of steel strip in gages down to 0.093 in. and widths up to 48 in., also plates ¼ in. thick and 60 in. wide in 75-ft. lengths.

These products are rolled from 6-in. thick slabs, 39 in. long, and of the width required in the finished product. For ease in handling and storing, the strip steel is coiled on leaving the last stand of the hot strip mill.

From the above it follows that stands No. 1 to No. 4 are independent as regards speed while No. 5 to No. 7 and No. 8 to No. 11 are interdependent.

Independent stands No. 1 to No. 4 are each driven by a wound-secondary induction motor and are equipped with flywheels. The motor horsepower varies from ¼ to ½ the total rolling horsepower, the remainder of the rolling energy being taken from the flywheel. The output of the motor is limited by automatic liquid slip regulators which introduce resistance in motor secondary as the motor primary current increases and so permits the flywheel to give up stored energy.

Characteristics of the first four stands, all with rolls



GENERAL Arrangement of Bar Plate and Hot Strip Mill, Showing Close Connection with Bloomer and Convenient Placing of Power Units

The mill consists of 11 stands. The first seven constitute the "bar mill" and normally reduce the sheet to about ⅜ in. thickness. The last four stands are the "hot strip mill." Between stands 7 and 8 are a runout table, a transfer, and a bar piler for taking off sheet bar or other heavy-gage product.

Close Speed Control Essential

While the initial length of slab when it enters No. 1 stand is 39 in., the length has increased to about 20 ft. in No. 4 stand, and is about equal to the minimum spacing between stands possible with this type of mill. Thus the remaining stands, to be economically spaced both for conservation of floor area and heat, must be on centers less than the length of the piece. As a result the piece, after leaving No. 4, is in two or more stands at the same time. This requires very close control of speed, as any change in speed or draft in one mill must be accompanied by a corresponding change in the other stands in the train. In rolling wide strip, wearing of rolls makes frequent changes in draft necessary.

32 in. in diameter, are shown in Table I on following page.

Interdependent stands Nos. 5 to 11 inclusive are driven by 600-volt d.c. adjustable-speed motors. Owing to the necessity for close speed regulation, and the fact that the piece is in the stand a considerable length of time, flywheels are impracticable here. The motors, therefore, must provide maximum rolling torque. These stands are all 4-high 56 in., with working rolls 18 in. in diameter, backing up rolls 36 in. in diameter, and have roller bearings. The seven motors are of heavy-duty type, with low pedestal bearings and fabricated structural steel bases. The four 3000-hp. motors, being of very low speed, require forced air ventilation.

Automatic Control of Coiler Speeds

Three coilers (working on successive pieces) take the strip steel from the last stand of the mill and form it into coils about 30 in. in diameter. The sheet is at a red heat when it enters the coiler and is cooled by water before being discharged. The coilers are driven by 75-hp, adjustable-speed d.c. motors, which actuate the coiler rollers

through multiple-spindle gears. The rollers bear on the surface of the coil and as the coil grows are expanded by a cam driven by a 5-hp. adjustable-speed motor. The strip steel is forced into the coiler by pinch rolls. The machine is started automatically when the strip completes a circuit from ground to the surface of an insulated roller.

TABLE I—SPEEDS INVOLVED IN STANDS NO. 1 TO NO. 4

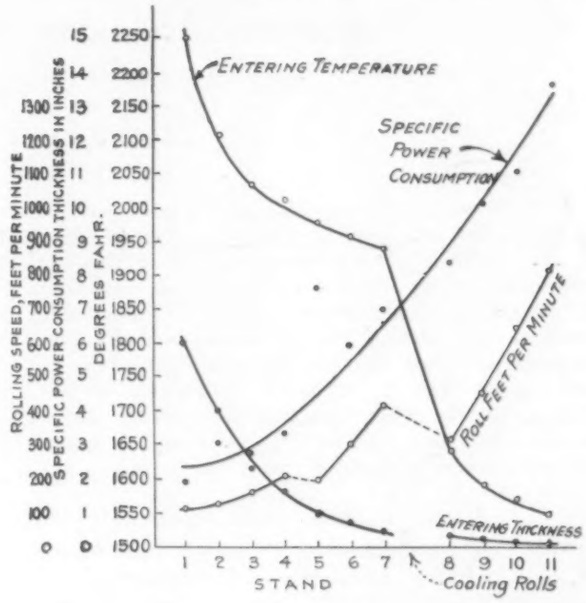
Stand	Motor Hp.	Speed Synchronism, R.p.m.	Flywheel Hp. Sec.	Gear Ratio	Mill, R.p.m.	Rolling Speed, Ft. a Min.
1	800	514	30,000	35:1	14.42	121
2	800	514	30,000	35:1	14.42	121
3	1000	600	40,000	29:1	20.18	169
4	1200	720	40,000	29:1	24.3	203.5

TABLE II—SPEEDS INVOLVED IN STANDS NO. 5 TO NO. 11

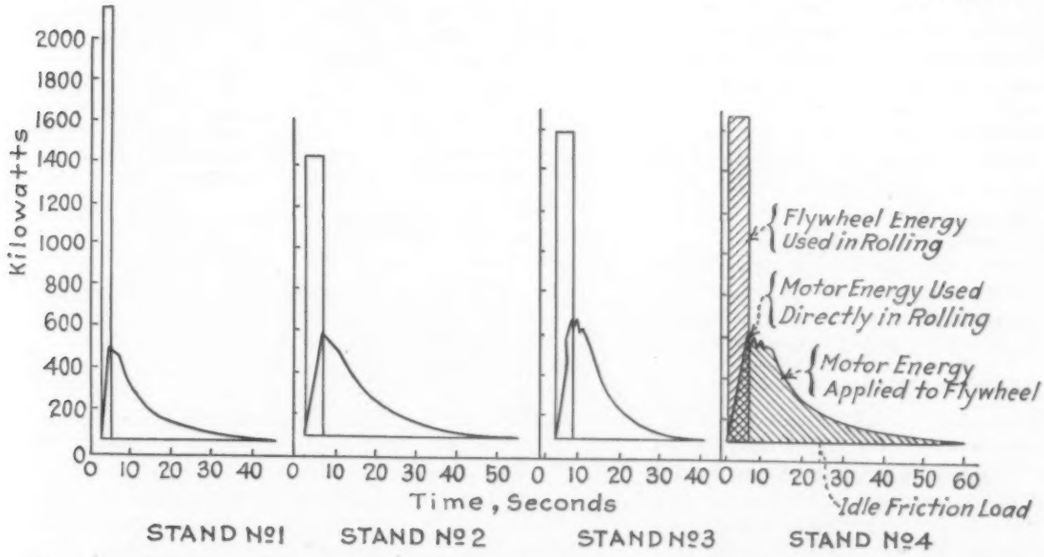
Stand	Motor Hp.	Motor Speed, R.p.m.	Gear Ratio	Mill, R.p.m.	Rolling Speed, Ft. a Min.
5	2000	300-500	8.1 :1	37.1- 61.70	174.7-291.0
6	2000	300-500	6.00:1	50 - 83.3	235.4-392.0
7	2000	300-500	5.32:1	56.4- 94.1	266.0-443.0
8	3000	180-360	3.02:1	59.6-119.2	280.5-561.0
9	3000	180-360	2.26:1	79.7-159.4	375 -750.0
10	3000	180-360	1.87:1	96.3-192.6	454 -908.0
11	3000	180-360	1.72:1	104.8-209.6	494 -988.0

Curves shown illustrate the relative value of different variables at each stand of the mill. The drop in temperature between stands 7 and 8 represents the critical range of ingot iron, between 1922 and 1562 deg. fahr., in which range the material may not be rolled.

From the test data the power consumption per ton of steel rolled is 32 kwhr., to which must be added the idle friction of mills, which make the total 40.3 kwhr. per ton, with a production of 150 tons an hour. To this must be added the power consumption of various mill auxiliaries, amounting to about 800 kwhr. an hour, making a total of 45.6 kwhr. per ton of steel from blooming mill runout to coil storage.



Relative Values at Each Stand of Roll Speed, Specific Power Consumption, Thickness of Metal and Entering Temperature. (above). Specific power consumption equals horsepower-seconds per cubic inch of metal displaced



Showing Effect of Flywheel in Providing Heavy Storage of Energy Which Is Drawn Upon as the Metal Is Entered Between the Rolls. Only a small part of the energy used in displacing metal is supplied by the motor at the moment that metal is being displaced

About 30 sec. suffices to coil, cool and discharge a strip of No. 12-gage steel 180 ft. long and 48 in. wide.

Power Requirements Affected by Many Variables

The power required to roll steel sheets varies with temperature, per cent reduction, speed of rolling, kind of material and diameter of roll. It is probable that a large part of the input to the old type mill with brass bearings is consumed in friction in the bearings. This fact is demonstrated in comparative tests made on the four-high stands of the mill herein described, which are equipped with roller bearings, and another mill making similar product and having brass bearings. In these tests it was found that the specific power consumption in the brass bearing mills was much higher than in the roller bearing mill. This difference increases as the temperature of the piece falls and bearing pressure increases.

Brake drums made of a nickel alloy cast iron with bands having molded linings will operate satisfactorily for 50,000 miles without overhaul, according to F. E. Dayes, chief engineer, American Car & Foundry Motors Co., writing in *Inco*. This alloy cast iron has a fine, dense, uniform grain, with Brinell hardness 260. Cast steel drums will either score the molded lining or develop alligator cracks from overheating. Steel drums and steel shoes, while very efficient and long lived, are objectionable because they squeal.

High-Test Iron Made by Six Methods

Foundrymen Hold Symposium at Chicago—European and American Progress Reviewed—Scrap Steel and Alloys Large Aids

A NEW era in gray iron may be said to have developed in the perfection of processes to make high-test cast iron. A notable symposium on this subject filled the room to capacity at the annual convention of the American Foundrymen's Association last week in Chicago. The session was prolonged to three hours to accommodate those desiring to speak. Under the chairmanship of Prof. H. F. Moore, University of Illinois, Urbana, Ill., the seven scheduled leaders were allowed to present their papers before any discussion. Only two of the papers were preprinted.

High-Test Cast Irons Defined

THE program consisted of a review of what has been done in Europe and America. The subject was introduced by a paper by R. P. Lemoine, Paris, France, on "High-Test Cast Iron," the annual exchange paper from the French Foundry Technical Association. Its 30 or more pages were abstracted by Prof. R. S. McCaffery, University of Wisconsin. It deals with the actual state of the production of high-test cast iron in Europe and chiefly in France. After reviewing the theory of high-test cast iron and showing that the lower the carbon, the higher the tensile strength, and also after discussing patented cast irons, alloyed irons, electric cast iron, the duplex process, low-carbon and high-test cupola iron, Mr. Lemoine says that the low-carbon cupola process is not, technically speaking, an improvement on the duplex, which is certainly the best of all at the present time.

Semi-Steel Is the Basis

A sound basis of production of high-test cast iron has been the semi-steel process developed during the war [in Europe], says Mr. Lemoine. Fairly good mechanical properties were obtained on test bars. But the development of the electric furnace for foundries has made possible the single and duplex processes, affording the first real possibility of adopting compositions with low carbon and high silicon, leading not only to better properties but also to good uniformity, and hence to more reliability. An interesting cupola process has been established from the careful study of melting scrap in cupolas for the duplex process, coupled with the knowledge of the fact that some kinds of scrap are slow in carburization. It may be possible to still further improve low-carbon cast iron by "jarring" or, better, "grating" the forehearth.

Of alloyed cast irons, Mr. Lemoine says that special elements are as a rule expensive and are to be considered only when it is necessary to further improve a given property—the same method which has been applied to alloy steels. Alloyed cast irons seem to be worth consideration in certain corrosive problems, for resistance to wear, etc. As far as mechanical strengths are concerned, alloyed cast iron can be considered as a reserve force to be used for further improvements.

High-Test Irons in Europe

FOLLOWING this general excellent introduction to the subject, Dr. Edward E. Marbaker, director, foundry research division, Whiting Corporation, Harvey, Ill., presented in abstract his paper "High-Test Gray Cast Iron—European Developments." The methods, now known, may be divided roughly as follows:

1. Decrease of carbon content.
2. Control of cooling rate after casting.
3. Reduction of particle size of graphite and improvement of distribution by (a) super heating, (b) rapid cooling of high-silicon iron and (c) treatment with calcium silicide.
4. Alloying elements such as nickel and chromium.
5. Agitation of molten iron.
6. Eutectic cast iron.

Each of these groups is discussed in the paper, tables and physical properties being given in some cases. Eutectic irons are comparatively new. They do not pipe, a quality which can be taken as a critical test of these irons.

Methods of producing high-test irons are numerous with considerable differences among them, said Dr. Marbaker. Resulting castings have much the same structure and properties, indicating some underlying general theory, as pointed out by Osann. The subject is still controversial but ways and means are now available for making better castings. Despite additional expense, the quality is more uniform and certain, and no lack of interest results.

The author supplemented his paper with a brief account of a new development since the paper was written. A rotating cylinder furnace has been tried out, at one end of which the charge is put in. It is fired with powdered coal and tapped at the center. When the charge is melted,

Six Methods of Making High-Test Cast Iron

I.—Decrease of Carbon Content.

II.—Control of Cooling Rate After Casting.

III.—Reduction of Size of Graphite (accomplished in three ways).

IV.—Adding Alloying Elements.

V.—Agitation of the Molten Iron.

VI.—Eutectic Cast Iron.

Four Contributors to the High-Test Symposium

E. E. MARBAKER

OLIVER SMALLEY

FRITZ MEYER

F. B. COYLE

the furnace is rotated completely, coating the walls. The product is eutectic in composition and is high-test.

German Opinion on These Irons

AUTHORITATIVE European opinion on recent developments in high-test iron was offered as coming from Dr. E. Piwowarsky of Germany by Dr. Fritz Meyer, National Radiator Co., Johnstown, Pa. An association of foundries making this and other special irons has recently been formed, important in that less secrecy now prevails and common benefits now result. Among the many striking comments, one was to the effect that in Europe much emphasis is laid upon the fundamentals in cupola operation and less on non-essentials, whereas in America more dependence is placed on additions to the charge or ladle, such as alloys. Dr. Meyer interjected the remark that he subscribed to this—"the addition of nickel and similar alloying metals is like the use of a pink pill" to cure physical ills. This created much merriment.

In Germany there is considerable demand from foundrymen for alloy-bearing pig irons. Some blast furnace men are importing Greek ores containing about 3 to 4 per cent chromium and 1 per cent nickel, the resulting iron being used to make iron rolls. Vanadium and titanium are finding use, as is also molybdenum as ferromolybdenum or molybdenum-bearing pig irons; calcium silicide is also being adopted.

Methods Used in America

AMERICAN developments were covered by four speakers: F. B. Coyle, International Nickel Co., New York; R. S. MacPherran, Allis-Chalmers Mfg. Co., Milwaukee; H. Bornstein, Deere & Co., Moline, Ill., and Oliver Smalley, Brooklyn.

For the first time, the process developed by the International Nickel Co. for making high-test iron was made public in a paper by Mr. Coyle in collaboration with A. M. Houston. Limitations to the place of cast iron in industry are being removed by the use of alloys, said Mr. Coyle, made possible by special processes. The greater demand for a stronger iron will lie between tensile strengths of 40,000 and 45,000 lb. per sq. in.

75 Per Cent Scrap Steel Used

The Nickel company uses a charge containing about 75 per cent of steel scrap with about 25 per cent of iron scrap or pig. Nickel is added either to the cupola or ladle, preferably to the latter. Depending on composition and other factors the resulting irons have a transverse strength of 4500 to 8000 lb., a tensile strength of 50,000 to 70,000 lb. per sq. in., an elastic limit of 10,000 to 12,000 lb. per sq. in. and a compression strength of 165,000 to 190,000 lb. These irons are claimed to have unusual impact and fatigue properties and to be readily machinable. The authors relate many industrial applications. The use of alloys is advocated to extend the range of composition and to obtain strength. By heat treatment the latter property in particular can be augmented.

95 Per Cent Scrap Steel Charged

Other American testimony came from the experience of the Allis-Chalmers company. Mr. MacPherran gave a history of his foundry's practice which is, briefly:

> A 54-in. cupola is used, having six tuyeres in a row. Charges of 3000 lb. are used: 94 per cent steel scrap, 4.5 per cent ferrosilicon and 1.5 per cent ferromanganese. Of 63 arbitration test bars, all from regular operation, the following tensile results were obtained:
>
> 5 bars.....47,900 to 50,000 lb. per sq. in.
> 37 bars.....50,000 to 60,000 lb. per sq. in.
> 19 bars.....60,000 to 70,000 lb. per sq. in.
> 2 bars.....over 70,000 lb. per sq. in.
> Aver. for 63 bars.. ...58,300 lb. per sq. in.
>
> No heat treatment is practiced. About 1 per cent nickel is added to the ladle; also a manganese-silicon ferroalloy containing about 25 per cent manganese and 50 per cent silicon. Metal is not chilled by ladle additions but it must be handled quickly. It machines like steel castings. Total carbon runs about 2.40 to 3.10 per cent, silicon 1.60 to 2.60 per cent, manganese 0.70 to 0.90 with a Brinell hardness of 240 to 290. The secret is low carbon and high temperature.

Iron from Three Cupolas

More American experience came from the Deere company. Mr. Bornstein recounted details of the use of a 28-in., a 54-in. and a 33-in. cupolas from which a series of casts were made. Charges varied as to percentages of steel scrap, always high, of ferrosilicon and of ferromanganese. Shot nickel was used in some cases, in others Mayari iron, molybdenum, nickel and molybdenum, and no alloys at all.

Invariably the carbon was low—lowest from the 28-in. cupola. Manganese averaged 0.65 to 0.80 per cent, phosphorus under 0.10 and sulphur well under the same level. Tensile strengths averaged up to 70,000 lb. per sq. in. with transverse values from 5300 to 7000 lb. Machinability offered no difficulties, though the irons were not

quite so readily machinable as ordinary irons. Those casts containing molybdenum, or nickel with molybdenum, machined better than plain iron—in fact "to obtain better machinability, alloys are necessary." Drop tests revealed toughness. Use of high-test iron means savings in weight and sections as well as possible substitutes for steel and malleable castings.

A strong recommendation for the use of calcium-silicide was made by Mr. Smalley. It insures a uniform regulation of the carbide of iron content, it is exothermic, does not contaminate and controls the deposition of graphite. From 30 to 70 per cent steel scrap is used. Analysis of the product, known as Meehanite, approximates: T.C., 2.80; Si., 1.20; Mn., 0.60 to 0.70; S., 0.10 to 0.15; P., 0.20 per cent; with physical properties: T.S. 51,000 lb. per sq. in.; transverse, 4800 lb.; Brinell 247, annealing at 1650 deg. for 4 to 6 hr. Lowers the strength and hardness.

General Comment

A RUNNING discussion, made up largely of questions and answers, followed. Dr. Richard Moldenke advised the discounting of much that is now claimed and said that very few of the patents would hold water. Pearlitic iron can be and has been patented.

THE IRON AGE Alloy-Iron Survey

Calling attention to a survey of one phase of high-test irons—alloy cast irons—made by THE IRON AGE and published March 28, Edwin F. Cone, associate editor, New York, pointed out that that survey revealed the use by a few American foundries of a vanadium-bearing pig iron from Norway, the pig iron containing 0.50 to 0.60 per cent vanadium, and the castings 0.05 to 0.10 per cent with beneficial wear-resisting properties and greater strength. Also that molybdenum is being used quite extensively in rolls and automobile castings. He cited the fact that an electric furnace company has a rocking type of furnace, which is now being used in a few foundries for making small iron castings, the claim being advanced that both the higher temperature and the churning or jolting action improve the iron. Mr. Cone also announced that, with the answers received to date, a return of 51 to 52 per cent in replies to 3818 letters had been obtained and thanked iron foundrymen present for their fine cooperation in the survey.

Shortening Malleable Annealing Periods

Foundrymen Learn of New Heat-Treating Furnaces and Methods—Causes of White Malleable—New Way to Control Furnace Atmosphere

AMERICAN foundrymen, at the annual convention of the foundrymen's association in Chicago last week, discussed their problems at a technical session and a round table luncheon. The technical session was devoted to malleable iron foundry practice under the chairmanship of Frank J. Lanahan, Fort Pitt Malleable Iron Co., Pittsburgh, followed by the round table discussion at which Scott Mackay, University of Wisconsin, was chairman. The latter, attended by about 60 members, was devoted mostly to an informal discussion of quicker methods of annealing, in which malleable foundrymen are deeply interested.

Malleable Annealing Period Reduced

It was brought out that two types of electric furnaces are now being used in which the annealing time is being expedited by heat treatment. The General Electric Co. has a furnace in operation at its Erie works which for some time has been annealing castings in lots of 1½ tons with an annealing cycle of 27 to 29 hr. This company is now building another annealing furnace in which a 6-ton load carried on a car will be annealed and it is expected that the annealing time will be reduced to 24 hr. This furnace will have three chambers in two of which the work will be held at a temperature of 1850 deg. Fahr. The high temperature of the entire mass will facilitate rapid annealing. The temperature will be reduced to 1550 deg. Fahr. in the third chamber. Air is excluded by water seal. When the material is below the critical point a sudden change of 50 deg. is made in the temperature, but not to above the critical point.

The other annealing furnace is being used in a Buffalo plant and was built by the Industrial Furnace Co. In this the annealing temperature has been reduced to four days, time being saved by bringing the castings up to temperature rapidly and in cooling from about 1100 deg. The holding time evidently is not changed. The results were said to be satisfactory. One user of the castings had found them easier to machine than those annealed by the ordinary method.

Three papers were presented at the technical session. The "Practical Aspects of White Fracture Malleable Iron" were discussed by Duncan Forbes, Rockford-Northwestern Malleable Corporation, Rockford, Ill. If the casting is not correctly annealed, the author said, it will have a white, sparkling fracture due to the presence of non-ductile pearlite or cementite, mixed with the ferrite of the matrix. Apparently white-fracture malleable is due either to the weakness or brittleness of the intercrystalline cement at low temperatures or else to a strengthening of ferrite at low temperatures, making it stronger than the cement.

Cause of Brittleness of White Fracture Malleable

If material, likely to cause white fracture, is annealed in a single annealing oven, the castings will not necessarily all be of white fracture when cold. Analysis and heat treatment both have a bearing on white fracture. The surest way to develop a white fracture is to heat the casting after annealing up to 850 deg. Fahr. and then quench in air or water. This is what happens in the hot dip galvanizing process and gives rise to galvanizing embrittlement.

The best way to avoid white fracture, according to the speaker, is to avoid the conditions under which it is formed. The analysis should be under 1 per cent silicon and 0.17 per cent phosphorus. The melting operation should be normal, excessively high annealing temperature should be avoided, the oven should be "pulled" at over 1000 deg., and the castings should not be reheated to 850 deg. If white fracture is encountered, he said, it can be corrected by the Flecto process in which the castings are reheated to 1200 deg. and quickly cooled through the 850- deg. range.

Neither Silicon nor Phorphorus Migrates

In a written discussion of the paper, H. A. Schwartz, National Malleable & Steel Casting Co., Cleveland, said that the author has identified the fault caused when malleable iron is embrittled during the galvanizing operation

and that he had shown that the fault, which can be produced in galvanizing, can also be produced under equivalent conditions during the supposedly normal heat treating of malleable iron. The speaker said that neither silicon nor phosphorus, two elements regarded as of major importance, will rapidly migrate in iron. It is likely, after annealing, that they will be found largely in the same position they occupied in the original iron. If, therefore, either phosphorus or silicon films determine the course of intercrystalline fracture, the crystal boundaries of the ferrite in malleable must in some measure coincide with the position of the phosphorus or silicon in the hard iron. He did not know whether this was true or not, but said that Mr. Forbes's paper had furnished an impetus for an investigation in that direction.

Change produced by the Flecto treatment, continued Mr. Schwartz, can hardly be the formation or destruction of films, but may only be the change of properties in the film as a result of temperature or heat treatment. This conclusion is supported by the fact that heat treatments, which change the character of the fracture from intergranular to intercrystalline and back, have been shown in his laboratory to be unaccompanied by changes either in electrical resistance or magnetic permeability, even when the tests were made on the same sample before and after heat treating.

Iron Nitride Must Be Considered

There was also a written discussion prepared by L. H. Marshall, Bureau of Standards, who said that it is becoming more customary for a buyer to test out his purchases. This to the producers of malleable castings means a more frequent asking of the question, "When is malleable iron not malleable?" The general answer is, "When it has white fracture." Due perhaps to superficial resemblance of the white fracture to that of hard iron, combined carbon has at times been given as the cause of the trouble. However, it has been shown that silicon and particularly phosphorus produce white fracture.

The speaker said that, as the author had pointed out, it should be shown that some element or combination will develop the characteristics exhibited by white-fracture malleable iron. Although silicon and phosphorus seem connected with this phenomenon, there is no record that they produce such results on any other ferrous alloy. However, pure iron containing nitrogen exhibits thermal effects around 800 deg. Fahr. Iron nitride will cause dispersion hardening at room temperature. This nitride tends to go into solution in iron at 1200 deg. Fahr. There is a suspicion, therefore, that there might be some connection between the two. A study of pure iron-silicon-phosphorus alloys, with or without the presence of nitrogen, would likely throw further light on this question.

Controlling Annealing Atmospheres in a New Way

A new method of "Controlling the Atmosphere in Malleable Iron Annealing Furnaces," used by the Ohio Brass Co., Mansfield, Ohio, was described by W. F. Graham of that company and illustrated with lantern slides. In preliminary investigations he said that it was found almost impossible to approach a neutral atmosphere during the holding period and maintain, at the same time, uniform temperatures. The two furnaces more recently installed are provided with a return gas system, some of the waste or flue gases being returned through the carbureter and burner. The return gas firing applies only to the holding period. The furnaces have been operated for some time with satisfactory results as to control and quality of the product. It was found that the return gas could be brought into the mixing chamber at 600 deg. Fahr. and then through the carbureter, producing a temperature of 400 deg. immediately below the burners. While this temperature carries a certain amount of heat into the burner gases, it is doubtful whether it directly represents a saving in fuel.

More Trouble from Hard Than from Tough Castings

In discussing the paper W. R. Bean, president Grindle Fuel Equipment Co., Harvey, Ill., said that the purpose of the experiment was to improve the quality of the product by reducing the oxidation of the castings. His company had experimented along the same line and has secured more perfect control of the temperature. If 200 lb. of coal per hr. is required to bring the furnace to temperature, it would take 20 to 25 lb. per hr. to hold it at temperature. One burner had proved unsatisfactory and they are putting in two burners, one to bring the furnace to temperature and the other to hold the heat. They had burned as low as 11 lb. of coal per hr. for holding the furnace at temperature. A reduction in the fuel required for annealing has resulted, it being possible to anneal 400 lb. per ton of coal.

Authors of Two Papers

W. F. GRAHAM

D. P. FORBES

The machinability of malleable iron is a vital condition, said Mr. Bean, because the automobile industry demands castings that can be machined rapidly. Most trouble comes not from hard castings, but from tough castings. By reducing decarburization at the surface better castings can be produced. Most recent furnace installations, the speaker said, are using automatic control for maintaining uniform furnace control through the holding period, the control keeping the furnace within a range of 20 deg.

Malleable Shrinkage Determined by Temperatures

An exhaustive, highly technical paper on shrinkage in white cast iron and including tables showing density and other data was submitted by H. A. Schwartz. The author, in discussing his paper, said that the question he tried to answer was whether one lot of iron in a casting will shrink more than another. The first problem was to find how much shrinkage there is. He designed a 2½-in. sphere for test purposes and poured 100 to 200 heats. Then he compared the apparent density with the real density and from these studies gathered considerable data. He tried to show whether chemical composition had anything to do with shrinkage. He found that the effect of carbon and silicon is very small. Mr. Schwartz said that the gist of his paper is that shrinkage is determined by temperatures and by various variables, the effects of these variables being much greater than the effect of carbon and silicon.

Scott Mackay, chairman of the division of malleable

iron foundry practice, made a verbal report. He said that it had been suggested that more work that is being done in research laboratories be made available. He declared that more educational work is needed and that faster progress would be made if there were greater cooperation of efforts between shops and laboratories.

Light on Steel Foundry Problems

Different Views on Causes of Porosity, at Foundrymen's Convention—New Alloy Steel Castings—Heat Treating Complicated Designs

IN the opinion of competent observers, there has seldom, if ever before, been a meeting of foundrymen during which sessions devoted to steel castings brought out so much valuable and interesting data, as at the annual convention of the American Foundrymen's Association at the Stevens Hotel in Chicago, April 8 to 11. John Howe Hall, Taylor Wharton Iron & Steel Co., in commenting on the meetings, held that those who took part in the preparation of the material and the handling of the sessions should be congratulated on the high average excellence of both the papers and the discussions.

There were three sessions in the steel foundry shop operation course, the fourth being merged with the general sessions on sand control. At one session ladle practice, the best designs for stopper heads, nozzles, etc., were described, and the subject of temperature control in pouring was touched upon.

Porosity Is a Problem

After a few members had talked upon these points, the discussion turned to the influence of mold conditions and of the condition of the steel upon the formation of pinholes at the surface of castings. A sharp difference of opinion was in evidence, some members holding to the view that sand condition is chiefly responsible for these pinholes, others maintaining that the steel is to blame. The influence of aluminum in checking the formation of these defects was brought up, as well as its influence in diminishing the toughness of the steel when used in too great an amount.

About 100 men sat down at the luncheon presided over by R. J. Doty, who opened it by stating that at this, the first roundtable meeting of steel foundrymen for informal discussion of their problems, it was hoped that subjects of mutual interest would be brought up and that those present would find the discussion profitable. Porosity as a problem of steel foundrymen, particularly those making light castings in green sand, bobbed up again as the subject of most interest to the majority of those present, and the meeting was adjourned only when the approach of four o'clock called the members to the afternoon session on sand control.

Opinions of members who participated in the discussion as to whether the steel or the sand is mainly responsible for the formation of surface pinholes were about equally divided between the two points of view, and it was agreed that the whole question is one that well merits some intensive investigation.

Relative Merits of Steel Melting Processes

As a side issue to this question, the relative merits of the several processes of steel making, from the point of view of the ease of "running" light castings, was brought up, and the qualities of the steel made by the different processes, which influence fluidity, were briefly discussed.

The one technical session devoted to the steel foundry, presided over by S. W. Utley, vice-president Detroit Steel Casting Co. and past president of the association, was well attended, and devoted to the presentation of two most interesting papers.

New Alloy Steel Castings

The first, by D. Zuege, Sivyer Steel Casting Co., Milwaukee, on "Alloy Steel Castings," presented the latest data on the so-called carbon-manganese steels, containing manganese in the neighborhood of 1.50 per cent, the nickel-chrome steels, the chrome steels, and a new steel that has recently been developed by the Sivyer company, containing manganese, chrome, nickel and molybdenum. The properties of the various steels in the heat-treated condition, as well as plain annealed, were given in considerable detail.

DAVID ZUEGE

JOHN H. HALL

In discussion, various members stated that their own results on the carbon-manganese steels were in close agreement with those of the author. A steel of manganese-chrome-molybdenum was mentioned as quite similar to the more complex alloy described by Mr. Zuege.

"Efficient Steel Casting Grinding," by F. A. Lorenz, Jr., American Steel Foundries, East Chicago, Ind., dealt with the improvements in cost of grinding castings that had followed the installation of up-to-date grinding equipment and the inauguration of carefully planned methods of supplying a steady flow of work to the men doing the grinding. The paper was discussed in detail by several members.

Committees Report Progress

Major R. A. Bull reported for the joint committee on the investigation of phosphorus and sulphur in steel, that the tests on cast steel containing varying amounts of phosphorus have been started, and that considerable prog-

ress has been made with them. The joint committee will make a special effort to get the results of these tests to interested foundrymen as soon as possible after the completion of the work.

A. H. Jameson, chairman of the committee on specifications for steel castings, reported that the much-discussed testing society specification for steel castings for high temperatures will apparently be adopted by that society in June, with a process clause confining the processes by which the steel may be made to "the open-hearth, electric, or other process approved by the purchaser," and with the chemical limits made mandatory, instead of simply recommended, as they are in the specification in its present tentative form. Apparently the long controversy over this specification will now be settled for a considerable time to come.

New Principles in Drying and Making Cores

A. C. Jones, Lebanon Steel Foundry, Lebanon, Pa., presiding over one of the steel foundry operation course sessions on core room practice, outlined the essential properties of core sands and binders, and mentioned the development of drying ovens embodying new principles in drying cores. Core testing methods were outlined by Mr. Young of the Detroit Steel Casting Co., and the construction of several types of newly developed core ovens was illustrated by a member.

Mr. Sager of the Bureau of Standards gave a summary of the work recently done at the Bureau on the use of rubber solutions and of rubber latex as binders for cores. The discussion of this subject showed that foundrymen are following developments closely, and some independent experiments have already been made. It is hoped that, at least for light cores, this new binder will be of considerable advantage, especially in view of the fact that rubber-bonded cores do not require oven baking, but are used after simply air-drying.

How to Heat Treat Complicated Castings

At the last session of the convention, on heat treatment of steel castings, discussion of the problems of heat treating complicated castings was unusually complete. John Howe Hall, the chairman, outlined the general principles of the subject, and spoke briefly of the significance of the usual static, dynamic and endurance tests. Mr. Sims, of the American Steel Foundries, talked briefly on the considerations governing the choice of a method of heat treatment, such as the size and shape of the casting, the analysis of the steel, the uses to which the castings are to be put, etc. He also amplified Mr. Hall's discussion of general principles.

A. W. Lorenz of the Bucyrus-Erie Co., Milwaukee, spoke on the heat treatment of alloy steel castings, illustrating his talk with lantern slides showing some of the castings heat treated in his plant, and the equipment of the heat-treating department. He also gave some interesting data on the heat treatment of ordinary cast steel in heavy sections. At this profitable two-hour session the possibilities of heat-treated alloy and carbon steel castings for heavy service were interestingly discussed.

Overcomes Difficulties in Dry Cleaning of Gas With Iron Oxide

In the dry cleaning of gas with iron oxide, the greatest drawback is the difficulty of using material in a sufficiently finely divided state to insure rapid reaction, according to Mr. Ferbers in the *Gas und Wasserfach*. This has been overcome by suspending the oxide in water, the mixture containing one or two grams of iron hydroxide per liter in the presence of alkali. Further facts, as given by the *London Iron and Coal Trades Review*, are as follows:

A plant capable of treating 100,000 cu. m. of gas per day has been built for the Mont Cenis Colliery, in Westphalia, Germany. It contains three washers, 59 ft. in useful height and 8.2 ft. in diameter. A test lasting 14 days gave the following results: Throughput of gas, 67,975 to 88,585 cu. m. per day; hydrogen sulphide in outlet gas, 6.0 to 0.6 milligrams per cu. m., corresponding with a purification efficiency of 99.97 per cent overall; air used, 4.0 to 4.5 per cent; daily consumption of caustic soda, 250 to 275 kg.; and of iron oxide, 80 kg. The sulphur recovered contained 37.5 per cent of water; the working temperature was 35 deg. C., and the cost of the process, 0.153 pfennigs per cu. m. of gas treated.

Heat Treatment of Bronze

Bronzes may be improved in one of four different aspects by a properly conducted heat treatment, according to C. H. Bierbaum, vice-president Lumen Bearing Co., before a recent meeting of the Hartford Chapter, American Society for Steel Treating. These are listed as:

1. Improve resistance to corrosion (a solid solution is more resistant than a fine-grained aggregate of two or more crystalline phases).

2. Improve the soundness. (Thin walled bronze castings with 93 per cent copper and 7 per cent tin are likely to be slightly porous as cast, but air-tight after proper heat treatment.)

3. Improve the tensile and impact properties.

4. Improve the bearing value.

It is well known that a bearing should not be a homogeneous metal (a solid solution), but rather should consist of hard crystals imbedded in a soft matrix. Therefore, in heat treating a bearing bronze the purpose should not be to form a solid solution, but to precipitate the hard delta crystal in a fine-grained matrix.

As regards item 3, Mr. Bierbaum indicated how an aluminum bronze (copper 89, aluminum 10, iron 1 per cent) could be given tensile properties comparable with those of steel by a proper quench and draw.

Metal at Center of Upset Forgings

To determine whether the spreading of the flow lines at the center of an upset forging indicated any lowered quality in the metal a number of 1¼-in. bars were upset to 1⅞ in. diameter for a length of 2½ in., according to E. R. Frost, president National Machinery Co., Tiffin, Ohio, speaking before the Toronto chapter of the American Society for Steel Treating. Standard test bars were then cut from the axis of all the upsets, and the elastic properties compared to those of the original stock, as follows (average of six samples):

	Ultimate	Yield Point	Elongation	Reduction
1020 steel, 1¼ bar..	51,800	32,900	45	70
Same, upset.....	50,800	32,700	46	69
3120 steel, 1¼ bar..	84,600	56,900	28	60
Same, upset.....	83,900	60,400	33	62

Three similar bars of 3120 steel were upset and the Rockwell hardness determined. Average results are:

Original 1¼ bar, hardness at center.....	83.8
Hardness ⅜ to edge.....	86.3
Upset portion, hardness at center.....	92.5
Hardness ⅜ to edge.....	95.2

Foundry Technology Forges Ahead

Research on Foundry Iron Enlightens Foundrymen at Annual Convention—Non-Ferrous Problems Solved—Cost Finding and Apprentice Training Other Topics

A TECHNICAL program, unusual both in its excellence and the attendance it attracted, was the feature of the annual foundrymen's gathering last week. It was the thirty-third convention of the American Foundrymen's Association and was held in Chicago, April 8 to 11, at the Stevens Hotel—a unique hostelry, where under one roof all activities, including an exhibition, were possible. Probably never in its history has the association conducted more successful technical sessions—this was a commonly expressed verdict. All of the 20 sessions and five roundtable luncheons were well attended, in many cases crowded. About 50 papers and reports were presented, several outstanding in merit.

Success attended the experiment of holding a limited exhibition. The 150 exhibitors reported keen interest from the large attendance as well as a lucrative business in many instances. The importance of an exhibit of some scope at a foundrymen's convention is demonstrated in this way: Two years ago, with no exhibit, the registration was about 1100; this year, the total was 3230, both in Chicago.

Only outstanding features of the technical sessions and of the convention as a whole, which embraced all departments of the foundry industry, can be reviewed in the following columns.

Qualities of Blast Furnace Iron Persist in Gray Iron

THAT there is keen interest in the question of the quality of pig iron as it affects the properties of gray iron castings was evident from one whole session devoted to one paper on this subject. The capacity of the room was taxed to take care of the 200 who attended.

The paper was especially noteworthy. All through the discussion testimony to this effect stood out. A. L. Boegehold, metallurgist, General Motors Corporation, Detroit, was the author. His paper of over 60 pages, entitled "Quality of Pig Iron and Castings as Affected by Blast Furnace Practice," covers extensive studies conducted by the research department of the corporation at the suggestion of the iron foundry division of the A. F. A. Only a brief sketch of its scope can be given here.

Pig Iron from 7 Blast Furnaces Used

Eleven casts of 75 tons each of No. 24 malleable pig iron, silicon around 2.50 per cent, were obtained from seven different blast furnaces over a period of a year. A record was made of all blast furnace operating conditions in each case. Five special tests were made of each heat of iron, including chemical analysis, microstructure, fracture, etc.

These pig irons were used as a raw material for making cast iron flywheels from a cupola. A definite analysis for them was aimed at. All cupola conditions were maintained in each case with as little variation as possible. The cast iron thus produced was poured into a variety of physical test samples designed to permit the measurement of ten different important tests.

Since all variables cannot be kept constant, four vital ones were considered: Amount of water in the atmosphere, temperature of the atmosphere, pressure of the atmosphere and variations in several properties of pig iron due to variable blast furnace conditions.

A mass of data was obtained. Naturally not all of it is contained in the paper. Mr. Boegehold presents many tables, charts and micrographs, reviewing some of the important results which throw entirely new light on this vital problem. A clear idea of the chief features and results of his investigation can best be given by quoting his conclusions and inferences:

1. Physical characteristics of pig iron persist through the cupola melting operation and are conferred upon the cast iron to which it is converted.
2. The formation of iron carbide is apparently fostered by the presence of moisture in the blast. The quantity of combined carbon formed increases with increase of water in the blast.
3. Properties of the cast iron which are dependent upon the amount of combined carbon present and upon the ease with which combined carbon is retained by rapid cooling are therefore related directly to amount of moisture in the blast.
4. Machinability of cast iron improves with diminishing quantities of moisture in the blast.
5. Tendency for the formation of white iron diminishes as the moisture content of the blast is reduced.
6. Tendency for the formation of shrinkage cavities is decreased by increasing the rate at which the ore burden travels through the blast furnace.
7. The rate at which the burden can be made to travel through the blast furnace depends upon the burning rate of the coke used.
8. A cast iron of a given analysis such as T. C., 3.30; Mn, 0.50; P, 0.15; S, 0.085; Si, 2.35 poured in dry or green sand, other conditions being constant, will vary in hardness 25 to 30 points of Brinell hardness, depending upon the quality of the pig iron used in the charge.
9. In a cast iron of above analysis a variation of silicon from 2.20 to 2.50 per cent silicon, other conditions being constant, will produce a drop in hardness from 5 points Brinell to 30 points Brinell, depending upon the quality of pig iron used in the charge.
10. The factors responsible for variations of tensile strength are influenced to a marked degree by many considerations. It can be said, however, that the tensile strength is influenced to a marked degree by the pig iron.

11. Machinability is improved by use of pig iron which has been completely reduced in the blast furnace and is made more difficult by too rapid progress of iron through the blast furnace.
12. The quality of the coke used in a blast furnace affects the pig iron in several ways, making it extremely important to have accurate control of this material.

Views of Several Authorities

UNDER the able direction of Dr. H. W. Gillett, chief division of metallurgy, United States Bureau of Standards, Washington, as chairman, a fruitful discussion followed, of which only a few points can here be reviewed. Preceding the discussion, Dr. Gillett paid a tribute to the author and the General Motors Corporation, pointing out that this was a striking example of the notable work which an industrial corporation can carry out, surpassing by far the efforts of a Government department or a university.

It is acknowledged that it is difficult to decrease the moisture in blast furnace operations, wrote John Shaw, the eminent British foundryman, and the suggestion is offered that it might be worth while to inject certain definite amounts of moisture into the cupola to determine its effect under certain conditions. R. S. MacPherran, metallurgist, Allis-Chalmers Co., Milwaukee, bore witness to experience similar to that recounted by the author—that variable conditions in the blast furnace are passed along through the cupola and suggested that a similar investigation on low-silicon irons might be fruitful.

Cast Iron Is a Diabolical Subject

Pig iron is not a simple subject, said Roy M. Allen, research metallurgist, American Car & Foundry Co., New York, but cast iron is a diabolical one. Mr. Boegehold's conclusions are corroborated by his experience, and it is true also that the effects of scrap in the blast furnace persist in the gray iron. All through the paper there pops up the little word "Why"—in every case difficult to answer. Moisture is a large factor, its dissociation resulting in the production of quantities of hydrogen, the effects of which are not known. One criticism is that an examination of the structure of the cast irons at high magnifications would probably reveal much important information. Mr. Allen illustrated his point by displaying on the screen photomicrographs of a variety of cast irons at 2000 and 3000 magnifications, which revealed many structures affecting the properties—structures not at all discernible in such detail at the lower magnifications used by the author.

First Research of the Kind

Pointing out that this is the first attempt to show the real effect of certain inherent qualities of pig iron on cast irons, J. W. Bolton, chief metallurgist, Lunkenheimer Co., Cincinnati, emphasized its large importance and success. And Robert Watson, M. A. Hanna & Co., Detroit, in the oral discussions, gave a vivid account of his operating blast furnace experience bearing on some of the points in the author's paper. The effect of moisture is important, he said, citing the fact that when the Gayley dry blast was first introduced, test samples broke easily because of hardness when the dry blast was not used.

A severe critical contribution was injected into the oral discussion by Prof. R. S. McCaffery, University of Wisconsin, Madison, Wis., which will be answered in detail by the author later.

May Have to Remove Moisture from Cupola

Moisture is of extreme importance in this whole question, declared Dr. Richard Moldenke; later it may be necessary to remove it from the cupola in which it promotes oxidation. In fact, steps are now being taken to try this out. Also preheating of the cupola blast is a coming development.

"I have been looking for some investigation like this for a long time," said Ralph H. Sweetser, vice-president, American Rolling Mill Co., Columbus, Ohio, "and this is a splendid job." Pig iron is a complicated problem. But there are one or two important points to be kept in mind, said Mr. Sweetser. As to moisture in the blast, at a temperature of 1200 to 1400 deg., in the hearth, hydrogen comes out as a gas at the top with no chemical effect; only a little more coke is needed. Another point—there should be regularity in pig iron composition. Some foundrymen want variations in manganese and phosphorus content with the silicon unchanged. This means a change in burden to meet these demands and this is a factor to be reckoned with.

Cost Session, as a Schoolroom, Works on Two Problems

FOUNDRY costs, the topic of one session of the Chicago meeting of the American Foundrymen's Association, prove to be as variable, or as elusive of precise calculation, as has been repeatedly charged, if indeed any proof of variations were necessary. The discussion centered around two problems, either one of which all present were asked to answer. One called for the approximate, or practical, cost of 100 lb. of iron castings and the other the cost of 100 lb. of a non-ferrous mixture. The cost of the metal and of the direct labor were given, so that each solver was left to add other items of expense, being admonished not to include any profit. A tabulation of answers, collected shortly after the session got under way, showed cost ideas ranging from 4c. to 11c. a lb. for the gray iron castings and of 30.25c. to 56.75c. for the brass castings.

With the results as an effective text, E. T. Runge, Cleveland, discoursed on preferred methods of figuring costs, emphasizing that the effort is to get into practice a simple and workable basis that many cover 95 to 97 per cent of all the castings made. What he had to say will be briefly summarized in the following, together with the information rather generally contributed from the floor with regard to melting losses, certain commercial practices and the like.

A. E. Hageboeck, Frank Foundries Co., Moline, Ill., was chairman of the session, and associated with him was James L. Wick, Jr., Falcon Bronze Co., Youngstown, Ohio. as chairman of the subcommittee on non-ferrous foundry costs. The attendance was close to 200, in spite of a simultaneous session respecting the quality of pig iron as affecting iron castings.

Chairman Hageboeck, in introducing the problems to the meeting, took occasion to refer to the earlier work of the cost committee of the association, and in particular to the committee's report at the Detroit convention, establishing five basic divisions for cost keeping, the thought being that, while the large foundry subdivides these classifications as needs be, it remains that much grief would be saved if the great bulk of the foundries would observe closely the simplified system. And parenthetically it may be mentioned that one note which was sounded several times during the discussions was that the industry needs to focus on determining a practical cost, which is not necessarily one carrying several decimal places. Mr. Hageboeck named ten cost groups of the association more or less active and told of three in the making—Kansas City, central Illinois and St. Louis. The ten organized cost groups are: Wisconsin (centered in Milwaukee), Iowa, Miami Valley (Hamilton, Dayton, etc.),

FOR 17 years president of the German Foundrymen's Association, Dr. Siegfried Werner, accompanied by Mrs. Werner, is visiting various American steel centers. He delivered two short addresses at the convention. Sometime ago Dr. Werner spent several years in the United States

Newark, northern New York (Syracuse), Tri-State (southern Ohio), Connecticut, Central States (Missouri, Michigan, Illinois, Indiana and Ohio) and two on the Pacific Coast. The five basic divisions are melting, molding, core making, cleaning and shipping, and administration.

Answers Varied Greatly

The accompanying table will help explain the problem. As indicated in the first column, the size, character or number of castings was covered by giving the cost of the molding and core labor. Each was left to use his own coke and cleaning figures and his own overhead and the like, and it was suggested he could consider a 40 per cent return of metal. The problem comprehended the production of 100 lb. of good castings, "castings that never come back." The results gave one estimate of $2.60 and another at $3.30, but these were ruled out as obviously indicating a misconception of the problem, seeing that the direct labor was $2.30 and the metal cost in the neighborhood of $1.50. Six replies were around 4c. a lb., five at 5c., 12 at 6c., nine at 7c., nine at 8c., one at 9c. and one at 11c.

Mr. Runge then showed his calculation of an average case, given in the second column of the table, and in response to requests one of the low estimates was shown, as given in the third column. In this case, Mr. Runge pointed out that the iron cost was low and the overhead only 93c., when ordinarily molding department expense is twice the direct labor charges and the core making department expense one and one-half times the core labor cost. In respect to the metal cost, it is well to remember, he emphasized, that for 100 lb. of good castings, one must furnish 108 lb. of fresh metal, with the expectation of shipping 102 lb. and getting possibly 2 lb. returned.

Melting Cost Should Include Fuel and Power

In referring to the melting cost, Mr. Runge asserted that it must include fuel, power, supplies and the like, suggesting that the case may be regarded as one in which the molding department is buying molten metal, or, in fact, each department should be considered as delivering a fully paid product to the next, in the process of manufacture, figured as so much a pound and making allowance for manufacturing losses.

In calculating molding costs, there is the recorded labor (thus to be spoken of, rather than productive labor). In the matter of flask carrying, it is impracticable to have a recorded labor, and then there are the items of sand, power, etc. Of the several methods in use, he prefers to cover the indirect charges as a percentage on the recorded molding labor.

The core department, he said, could be regarded as a core factory or a sand foundry. Here again he would allow for such items as the pasting, filing and blacking of cores and the cost of the mixing compounds and fuel, sand, etc., as a percentage on the core labor.

The cleaning and shipping work interposes the more difficult considerations. There is the night gang for cleaning up and preparing sand. There is the tumbling labor, the sand blast labor, sorting, grinding, etc. Some are on piece work and therefore there is some recorded labor. Most foundries find it impracticable to use such records or to have the corps of clerks necessary to keep records according to tonnage. He was in agreement with the contention that the shipping, inspection and grinding cost can be applied against the recorded molding labor as commonly having a close relation to that labor cost, while tumbling may be applied directly to the weight of castings tumbled. He commended in particular pamphlet No. 17 on foundry cost systems issued by the National Association of Cost Accountants.

It was pointed out that cleaning is concerned with surface and not weight, and special cases were cited as requiring special treatment, such as castings which are substantially all core and castings in cores where there is actually no molding labor. It was emphasized, however, that the effort is to get intelligent cost finding where now it does not exist, and the chairman expressed the hope that some day foundries will have adopted a standard method and all will then be talking of the same thing.

The Brass Castings Problem

In the matter of the non-ferrous problem, Mr. Wick explained that a virgin metal mix was contemplated, with yield according to each one's experience and 50 per cent foundry returns. The answers collected from the audience ranged from 30.25c. to 56.76c. a lb. The average calculation, submitted by Mr. Runge and given in the accompanying table, put the price at 35.06c. a lb.

The conversion charge of $2 for the 100 lb. includes fuel, labor of melting room, taxes, insurance and repairs. Actual figures in industry were said to range from $1.32 to $4 and over. To make the 100 lb. of good castings 105 lb. of metal was regarded as needed. It was pointed out that one may divide the amount required by 0.96 or 0.97 to get the weight of charge when using the electric furnace.

A somewhat active discussion on the matter of metal losses followed, in part in response to a question as to whether or not an electric furnace manufacturer's claim of guaranteeing a loss of not over 1 per cent was reasonable. Various answers were forthcoming. In one plant over a two-year period, making a product of 80 per cent copper, 2½ to 3 per cent tin, 5 to 10 per cent lead and 7 to 8 per cent zinc, the over-all loss was 1.65 per cent.

AN addition to the list of honorary members of the A. F. A. was made this year by the directors in the person of J. H. Whiting, chairman of the board, Whiting Corporation, Harvey, Ill.

Of this the loss in melting was one-third, the rest being made up of losses in the ladle and in the handling from ladle into the mold and losses in skimming and in sand blasting, the last being larger than generally apprehended.

Another experience as to losses was ¾ to 1 per cent in manganese bronze and yellow brass. Another was of 1.72 to 1.75 per cent in red brass and up to 4 per cent for yellow, but not in the electric furnace. A third experience was 2.4 per cent over a year for a product half red and half yellow brass. Another contribution was that, after all salvage was obtained and disposed of at the full market value, the loss was 3½ per cent in the case of the open fire furnace, 3 per cent in the case of the crucible furnace and 1.35 per cent with electric furnaces; it was emphasized as a factor of prime importance, for with 20-cent ingot metal, each per cent means $4 a ton. Still another figure was 7.4 to 10 per cent in the case of high lead alloys, the maximum for yellow brass of 30 to 35 per cent zinc, while for brass of the composition of the problem, it was 3 per cent. One way of minimizing the loss, it was mentioned, is to melt the copper first, adding later the low temperature melting alloys.

Cost (Before Adding Profit) of 100 Lb. Gray Iron Castings Made by Bench Molding

	The Example	An Average Accdg. to Runge	One Low Estimate
Metal	....*	$1.52	$1.40
Molding labor	$1.50	1.50	1.50
Molding expense	....	3.00	....
Core labor	.80	.80	.80
Core expense	....	1.20	....
Expense	....	....	.93
		$8.02	$4.63

*Pig iron, $22.40 per gross ton, f.o.b. foundry.

Cost (Before Adding Profit) of 100 Lb. Brass Castings

		The Example	An Average According to Runge
Copper	85 per cent @	$0.25	
Tin	5 per cent @	.50	
Lead	5 per cent @	.08	$25.81
Zinc	5 per cent @	.08½	
Conversion		....	2.00
Molding labor		2.00	2.00
Molding expense		....	4.00
Core labor		.50	.50
Core expense		....	.75
			$35.06

Practical Non-Ferrous Melting Problems Aired

SOME practical problems in the brass foundry were discussed by H. J. Roast, National Bronze Co., Ltd., Montreal, at the non-ferrous session. This was an oral discussion as the speaker had not prepared a paper.

Casting a Large Bronze Door

Mr. Roast described the methods employed in molding and casting an architectural bronze door 4 x 13 ft. by ¼ in. thick and having large panels. This, he said, was difficult to make in a single piece because of the large area of material. The usual practice would be to cast it in several panels. The casting was made of 10 per cent zinc, 5 per cent tin and the remainder copper. The pattern was made of aluminum, wood, bronze and wax. New French sand was used for molding and old French sand for facing. It took two men and a helper 12 days to make the mold, which was dried 2½ days in an oven. The mold was poured from five reservoirs from which runners led to the center of the panels, these being in addition to the usual runners. There were five risers on the side opposite the reservoirs. The mold was set at an incline of 2 in. in one foot. The bronze was melted partly in an electric arc type furnace and partly in crucibles. It was brought to a temperature of 2300 deg. Fahr. and poured at about 2150 deg. Fahr. The casting had no obvious flaws on the surface and cracks closely followed the panel lines.

Making White Bronze Grills

Another problem, described by Mr. Roast, related to making white bronze grills for mirror frames that are pressed down against the glass. Too much brittleness was avoided and a satisfactory casting was produced by using a composition of 25 per cent tin and the remainder lead. Troubles experienced in making a combined button-hook and shoe horn of manganese bronze, requiring strength close to that of steel, were solved by gating at the center.

In reply to a question during the discussion, Mr. Roast said that he added 1¼ per cent of zinc just before pouring the door casting for deoxidizing purposes but used no phosphorus although he does use it in most castings in which phosphorus can be used.

Operation and Cost of Electric Melting

Practical melting with an electric arc furnace in a general jobbing brass foundry with special emphasis on operation, maintenance and cost was discussed in a paper by J. B. Meier, vice-president F. & H. Foundry Co., Newark, N. J. The conditions described, Mr. Meier said, were in a foundry largely on semi-production work. The remainder is mostly plumbers' brass goods from 3/32 in. down to 1/16 in. sections. The thinner sections have been introduced recently, requiring an increase in the pouring temperature from 2100 deg. Fahr. to 2200 deg. Fahr. and increasing the pouring difficulties. Melting is done in two 350-lb. electric furnaces. The metal used is an 85⅝ mixture composed on the average of two parts ingots, one part scrap and three parts gates. The brass is composed of one part ingots, two parts scrap and three parts gates.

Mr. Meier declared that pouring and charging in the minimum time possible is essential. They take from 5 to 7 min. to charge and pour. The rocking of the furnace is of importance. They usually start rocking at 10 kw. and come to a maximum at 35 to 40 kw. It is important to maintain the proper arc, accomplished by keeping an eye on the metal. The operator is required to keep complete records to determine the cause if trouble develops. A furnace charge is about 400 lb. when using half ingots and the balance scrap and gates. Charging various types of metal is not so easy as with oil or coke-fired furnaces.

Melting Cost per Ton

Operation of the furnace does not require special skill, but constant attention. Several linings, with a carborundum base, have been used but these have been replaced with firebrick material. The greatest source of expense, aside from the linings, are the cables. A year's service is secured from these by reversing the ends. At the start they used two 100-kva. transformers, but he believed larger transformers should be used and one has been replaced with a 150-kva. unit. Negroes are used for labor and the labor turnover has been reduced since the electric furnaces have replaced the oil-type furnaces.

The melting cost per ton has been $13.54, exclusive of metal cost, compared with $17.50 when using oil-fired furnaces. Including the metal lost, the cost is $20.50 a ton as against $31.10 for fuel oil.

Cost Data Declared High Though Satisfactory

In the discussion Mr. Roast said that in his plant they had melted 3,500,000 lb. of metal running 14 to 20 per cent lead at a temperature of 2200 to 2300 deg. Fahr. in an electric furnace with one lining. H. F. St. John, De-

troit Lubricator Co., stated that, while Mr. Meier's cost figures appeared high, they were really satisfactory. He emphasized the importance of having efficient labor for operating an arc furnace. In his company's plant they charge and pour in four minutes. White labor only is used, for which 85c. per hr. is paid. Before putting in the electric furnace, they had used crucibles and the substitution of the former resulted in a saving of one-third, including metal loss. Several others declared they had reduced the melting cost by using the electric furnace.

Chairman Clamer indorsed the statement of one of the speakers who said that standard factors should be worked out so that comparisons of metal costs could be made under similar conditions.

J. W. Bolton, chief metallurgist, Lunkenheimer Co., Cincinnati, chairman of the division, gave a brief outline of the steps that have been taken to organize the division with various committees along the line of the steel and gray iron divisions in order to secure a better dissemination of information. This is to include a course of instruction.

Two Round Table Luncheon Discussions

Round table luncheon discussions were a striking feature of the convention. Five of these were arranged and two of them were devoted to non-ferrous subjects. The attendance of each of the latter was close to 100. The first one was confined to informal and intimate discussions of cost methods and was presided over by E. D. Hazen, president, Brass Foundry Co., Peoria, Ill. There was free interchange of experience in the cost of producing many types of non-ferrous castings and the net result was the carrying away from the meeting of practical suggestions which would aid in reducing the costs of producing these castings in various foundries.

The second round table discussion was devoted to general shop practice, presided over by J. W. Bolton, chief metallurgist, Lunkenheimer Co., Cincinnati. At this meeting, questions were formulated at each table during the luncheon to which certain foundrymen desired answers. These were taken up in order by the chairman and a decidedly fruitful interchange of opinion resulted. Some foundrymen were having trouble with the successful production of certain types of aluminum, brass and bronze castings, particularly as to gating and as to the overcoming of defective surfaces. In almost every case some member was able to offer suggestions from his own experience as to overcoming the difficulties encountered, and this meeting, which lasted well into the afternoon, was one of the most profitable of the week.

Training Apprentices and Foremen

COMPETITION, quality of product, and lower prices are the factors which are forcing to the front the need for the utmost in the way of skill in foundry work. How these problems are being met was explained in a paper "Why We Train Apprentices," by J. A. Davies, general superintendent, Westinghouse Electric & Mfg. Co., South Philadelphia Works, Philadelphia.

How to Train Apprentices

This company is training apprentices for the sole purpose of getting into the foundry force, young and virile men with alert brains, who can reason cause and effect, and who can apply common rules of science that have so largely contributed to the success of other branches of industry. These men are carefully watched and their progress in the trade followed, so that those who possess the qualifications may be made supervisors. Preference is given to high school graduates, because their larger store of knowledge, particularly in mathematics and English, will enable them more readily to deduce facts and then put them into clear expression.

AS technical secretary of the association for the past three years, R. E. Kennedy is one of the most active men in the organization. All convention papers and programs are under his efficient direction. He will be one of the representatives of the A. F. A. at the international meeting in London in June

Why a Large Foundry Started Apprentice Training

Advantages foreseen in building an organization with good, reliable, trained and intelligent workmen were the determining factors which prompted the establishment of apprentice training at the plant of the Pettibone Mulliken Co., Chicago. The practical operation of this plan was described by A. M. Cornell, vice-president of the company, in a paper entiled "How We Train Apprentices." Applicants for this course are obtained through schools, by recommendation of employees and the apprentices themselves, through department heads, executives of the shop, and even salesmen of companies who supply the foundry with material. When a boy applies for a position every possible effort is made to determine the class of shop work in which he is most interested. He is shown the various departments, the good features as well as the bad, and various kinds of work are pointed out to him. Each applicant is placed on probation for a period of three to six months, during which time he is first assigned to clerical and then to core room work.

All shop instructions are given by the foremen who thoroughly outline the jobs to the apprentice. Three hours a week are spent in the plant class room, one for mathematics, one for mechanical drawing, and one for talks. The class instructor is an employee of the engineering department. Although a definite training schedule is attempted, there have been business conditions whereby it has been found exceedingly advantageous to transfer apprentices to departments which temporarily fall behind on schedules. The apprentices are returned to their course work as soon as the pressure in the department in question is relieved. Apprentices are not laid off as are other employees, during slack periods.

Loss of Apprentices Least from Higher School Grades

Apprentice turnover is least among those boys who leave school in the higher grades, according to charts displayed by F. A. Lorenz, assistant vice-president in charge of operations for the American Steel Foundries.

His analysis was based on one year's experience with a cooperative apprentice training system employed by six plants in East Chicago, Ind. It has been his experience that the rate of apprentice turnover is highest among molders and that the best grades made in the apprentice schools are attained by boys who did not leave school at an early age.

Notwithstanding the increase in the use of welded steel, A. E. Harrison, assistant works manager, Allis-Chalmers Mfg. Co., Milwaukee, believes that the demand for skilled foundrymen will expand. His company pays apprentices 35c. an hour at the start and it does not hesitate to let them engage on piece work when opportunities present themselves. This company has had satisfactory results in accepting a few boys from reform schools.

A Symposium Deals with Foreman Training

REGARDLESS of training received in city, State or national clubs, or by study of correspondence school or university extension courses in foremanship, there is still need of foreman training by management, according to A. D. Lynch, personnel director, Ohio Brass Co., Mansfield, Ohio, who read a paper on "Foreman Training," as part of a symposium on the subject. Meetings for this purpose should be held after working hours and they should be conducted by the executives, preferably the general manager or factory manager, and the program from the start should be one of education in the business facts and policies of the company.

Policies of Each Department Should Be Explained

When this stage of the program is completed, sub-executives should in turn explain the workings of policies of their departments; the manufacturing superintendent, production manager, cost manager, personnel manager, technical and engineering department heads, and so forth, should each give the foremen all the facts and figures that pertain to the respective operating departments.

When preparing a foreman's training course, it should be borne in mind that the foreman is responsible for getting out the product. Inspections cannot completely safeguard quality unless the foreman in direct charge of processes knows thoroughly the standard of quality desired. Intelligent supervision during process is the only sure safeguard for quality. Final cost can be properly controlled only when the foreman understands costs, knows his own costs, and intelligently accepts cost of product as one of his responsibilities. There can be little doubt that the best efforts of the planning or production department will not be realized unless the foreman knows the capacities of his men and machines, and unless he plans intelligently his program in keeping the schedule of the planning department.

Other factors with which the foreman must be familiar are the maintenance of plant, good housekeeping, safety and economy of operation.

In handling workers the foreman must be able to place his men according to their ability and capacity. He must give instructions properly and manage individual workers according to their temperament. He must delegate work and responsibility correctly and supervise it properly. Further, he must set a proper example and compensate fairly and proportionately. Finally, it is important that he should secure and hold the friendship and respect of the men working under him.

Experience indicates that 15 to 18 constitute the ideal conference group. Enrollments usually range from 10 to 20, while 8 is the minimum and 25 the maximum group that can be handled satisfactorily, according to a statement in a paper on "Foremanship Training," by A. B. Peirce, director, Department of Industrial Education, National Metal Trades Association. It is best, wherever possible, to hold meetings on company time, as this assures full attendance, discovers men who are good organizers, develops understudies, and indicates the desire on the part of the management to make the program and activity worthy of serious attention. Meetings should be held either weekly, every other week, or monthly, and they should preferably be limited to a duration of an hour or an hour and a quarter.

Foremen Often Chosen Because They Are "Good Fellows"

During the discussion of these papers it was disclosed that foremen are too often chosen because they are good fellows and, when this is the case, it is usually found that they lack technical understanding of the problems at hand. It was rather generally thought that foremen training should be done on the job.

Authors of Two Papers

A. M. CORNELL

J. A. DAVIES

New Officers Elected at Chicago Convention

President (one year): Fred Erb, president Erb-Joyce Foundry Co., Detroit.

Vice-President (one year): N. K. B. Patch, secretary Lumen Bearing Co., Buffalo.

Directors (three years): Harold S. Falk, vice-president and works manager, Falk Corporation, Milwaukee; Frank J. Lanahan, president, Fort Pitt Malleable Iron Co., Pittsburgh; Arnold Lenz, manager, Chevrolet Motor Co., Saginaw, Mich.; Delos H. Wray, vice-president, Henry Wray & Son, Inc., Rochester, N. Y., and S. T. Johnston, vice-president, S. Obermayer Co., Chicago.

American Foundrymen's Prizes Awarded

Bestowed on Nine Apprentices—Prizes for 1928 Convention Papers —Limited Exhibition a Success

ANNOUNCEMENT was made at the annual meeting that the membership of the association had increased from 2330 on Jan. 1, 1928, to 2365 on the last day of the year. During the year 218 members were added and 183 were lost through resignations and death. Total assets at the end of the year were $80,872.50 and the exhibit reserve fund at the beginning of the year stood at $39,757.87.

Next Convention at Cleveland

Announcement was also made that the thirty-fourth annual convention will be held in Cleveland the week of May 12, 1930. The Cleveland Auditorium has been enlarged so that 150,000 sq. ft. of space is now available for exhibits. Additional rooms make it possible for all technical meetings to be held adjacent to the exhibit.

Prizes for Papers at 1928 Convention

Secretary Hoyt announced the award of prizes for papers presented at the 1928 convention in Philadelphia. These are as follows:

H. A. Mason, Gould Coupler Co., Depew, N. Y., was awarded one of the prizes for his paper on "Reducing New Sand Consumption in a Steel Foundry." W. F. Roeser and H. T. Wensel, of the Bureau of Standards, were also honored for their paper on "Temperature Measurements of Molten Cast Iron." O. W. Ellis was given a prize for his paper, "The Effect of Lead on the Properties of a Complex Brass." Mr. Ellis was connected with the research department of the Westinghouse Electric & Mfg. Co. as research engineer at the time of writing the paper and is now with the Ontario Research Foundation, Toronto, Canada.

Prizes Awarded in Apprentice Contests

Technical Secretary R. E. Kennedy announced the results of the contest among apprentices in pattern making, gray iron molding and steel molding during the past year. The apprentices participating in the contest were located in 15 different foundry centers in the country. The results of the contest were as follows, three prizes being given in each contest:

Patterns: First, to H. Smith, Milwaukee Pattern & Mfg. Co., Milwaukee;

New President, Vice-President and Retiring President Who Becomes a Director

FRED ERB

N. K. B. PATCH

S. T. JOHNSTON

Four New Directors Elected for Three Years

D. W. WRAY

H. S. FALK

F. J. LANAHAN

ARNOLD J. LENZ

second, to V. Tatterwossian, Brown & Sharpe Mfg. Co., Providence, R. I.; third, to S. Morrotto, Fletcher Works, Philadelphia.

Iron Molding: First, to M. F. Chapman, Brown & Sharpe Mfg. Co., Providence, R. I.; second, to C. W. Hanson, Brown & Sharpe Mfg. Co.; third, to A. Lachowicz, Calumet Foundry, East Chicago, Ind.

Steel Molding: First, to G. Warnek, Sivyer Steel Casting Co., Milwaukee; second, to H. Poepke, Falk Corporation, Milwaukee; third, to M. Gadzala, Hubbard Steel Foundry Co., East Chicago, Ind.

Announcement was also made that the S. Obermayer prize for 1929 was bestowed upon H. Blair, an apprentice molder, Brown & Sharpe Mfg. Co.

Address by Doctor Werner

A feature of the annual meeting was a brief address by Dr. Siegfried Werner, Duesseldorf, Germany. Doctor Werner has been president of the German Foundrymen's Association for many years and is chairman of the International Foundrymen's Committee. He voiced his admiration of the exhibition, considering it a model, and stated that in each country cooperation is essential among foundrymen in both scientific and technical endeavors. He also expressed his appreciation of his reception in this country and of the generous liberality of Americans in general. He urged attendance of as many American foundrymen as possible at the Third International Foundrymen's Convention in London the first week in June, and stated that the fourth international meeting would be held in Duesseldorf, Germany, in 1932.

Russians Are Visitors

A group of Russians, headed by Mr. Bagaeff of the New York office of the Amtorg Trading Co., were interested guests at the exhibition, looking over equipment. It was understood that they had made arrangements for considerable equipment for one Russian foundry for manufacturing tractors, and that they also have inquiries out for complete foundry equipment for three other plants—one for making tractors, a second for sewing machines and a third for agricultural implements.

For the first time the directors of the A. F. A. tendered a luncheon Monday, April 8, to the members of the various committees of the organization. Out of 129 committee members 70 were present at the luncheon, which was addressed by President Johnston.

Presentation of Seaman Gold Medal

A feature of the banquet was the posthumous presentation of the Joseph S. Seaman Gold Medal, which was awarded to Jesse L. Jones, who died Jan. 22, just after the medal had been awarded. The presentation was made by G. H. Clamer, one of the directors and president of the Ajax Metal Co., Philadelphia, to Mrs. Jesse L. Jones, who accepted it in a graceful speech in behalf of herself and children.

An impromptu address by Doctor Werner was also a feature.

Limited Exhibition a New Departure

THE exhibit of foundry equipment in connection with the foundry convention was unique in that, with reduced space and limited exhibits, it was a marked departure from previous foundry shows. A large amount of equipment was shown in a restricted floor space and an agreeable feature to many was the absence of noise and dust.

The plan of holding a restricted exhibit with more limited displays and the elimination of molding machines in operation making molds proved satisfactory to exhibitors and there was enough equipment on display to make the show highly interesting to spectators. Because the exhibition space was limited in area and all in one hall, it was decided to restrict operations of equipment to exhibits that are not noise producing and which do not create dust. While this rule did not permit the making of molds and the use of sand on the floor, the molding machines and some of the other machinery, such as cranes and hoists, were connected with power so that mechanical operation of the machinery could be shown.

While the restricted exhibit this year resulted in a falling off in attendance, a larger proportion of the visitors than have heretofore attended were plant executives who are prospective purchasers of equipment, and so exhibitors developed a good volume of business.

There were 151 exhibitors as compared with 267 at large exhibitions in Detroit in 1926 and with 239 in Philadelphia in 1928, and the floor space was only 20,000 sq. ft., or 25 per cent of that occupied at the Philadelphia and Detroit shows. At the Chicago convention in 1927 there was no exhibit and many in the foundry industry drew the conclusion that a definite policy had been adopted of holding biennial exhibits. However, it was decided, after the large Philadelphia show, to try the plan of holding a small exhibit this year.

With the exhibit hall in the basement of the hotel the exhibits and convention were under one roof, which proved very convenient. The exhibitors made the most of the room allotted to them. Makers of such equipment as molding machines contented themselves with showing fewer of their models than at most of the recent shows. Photographs were used to a larger extent than heretofore, especially to show some of the larger types of equipment such as sand handling, mold conveying and other material handling equipment. As at previous shows, the exhibit was a comprehensive display of equipment and appliances of the modern type.

While various refinements in machine design were presented, there were very few new models. However, not a great deal of new equipment could have been expected in view of the fact that only 11 months had elapsed since the Philadelphia show. There were numerous exhibits of molding machines, sand blast equipment, trucks, vibrators, tumbling mills, grinding machines, portable tools and other mechanical equipment. Lack of space prevented exhibits of standard metal-working machine tools. However, woodworking machinery used in pattern shops was shown.

A redesigned 18-in. draw roll-over molding machine with air-locked equalizer for plate work and a redesigned stripper were shown. A new application in the core oven field was an electrically heated oven provided with an agitating system. The oven had thermostatic control. Core oven photographs showed a marked tendency toward vertical type ovens. A redesigned snagging machine that was shown has three speed changes, permitting the starting with a 30-in. wheel and wearing it down to the stubbing diameter without changing the wheel.

A new combination sand handling and pouring system, shown by photographs, attracted interest and seemed to appeal particularly to smaller foundries, although it can be used in both large and small plants. The system consists of an overhead portable conditioning apparatus, a series of overhead sand storage hoppers, a set of gravity mold conveyors and a pouring system. This system is arranged in units and one of the advantages claimed for it is that it has an overhead portable conditioning unit that operates on each sand pile individually, it being necessary to operate it only for the number of molders. Tunnels and conveyors under the floor are not required.

A new type of chaplet attracted considerable interest. This is said to be non-chillable because of its design and thin section and will fuse with the metal and become an integral part of the casting. Another feature is that it is adjustable and can be compressed in a vise to fit requirements of several sizes and bevels.

Some of the exhibits will be sent to the show in connection with the International Foundrymen's Congress in London, June 11 to 15. Reservations were taken at the show for transportation to the London convention and already 50 foundrymen have made reservations for the trip.

Sessions on sand control, materials handling, gray iron shop operation and iron foundry practice will be reviewed in later issues.

Consumer Demand Decrease Near

Less Activity in General Manufacturing and in Building —But Huge Production Is in Line with Immediate Needs

BY DR. LEWIS H. HANEY
DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

OUR steel consumption barometer again shows signs of a decrease in requirements of consumers. The composite index of activity among consuming industries rounded off in February, and a preliminary figure for March indicates a considerable decline. This does not necessarily mean a decrease in buying; for forward purchases, stimulated by price advances and the anticipation of future expansion, may continue. In view of the indicated trend of the barometer line, however, such an expansion in forward buying will probably prove to be in excess of requirements and result either in the accumulation of stocks or in an inflated condition of "unfilled orders."

As yet, the steel industry is not in the position of copper, since it shows no great or general over-buying and no runaway market. The production of steel, though increasing, is still in line with the potential current requirements, and any unhealthy developments have thus far been confined to a few lines or localities.

Building and Manufacturing Activity Lower

GAINS in mining, exports, railroad transportation and automobile production caused the small rise in the composite demand line during February. Building contracts and general manufacturing (excluding automobiles) actually decreased, due allowance being made for the season. March figures show a decline in railroad freight traffic, building activity and automobile production, all of which increased considerably less than usual for the season.

Conditions in Specific Lines of Industry

As to the future, one of the more certain developments appears to be a decline in *automobile production.* While the March output was record-breaking, it was also less above the February figure than usual. This tends to confirm current reports of spotty retail sales and undue accumulation of stocks of new cars in the hands of dealers. Several price cuts also appear to have some significance. Automobile production in April and May will doubtless continue at a very high rate, but will nevertheless probably show declines from March.

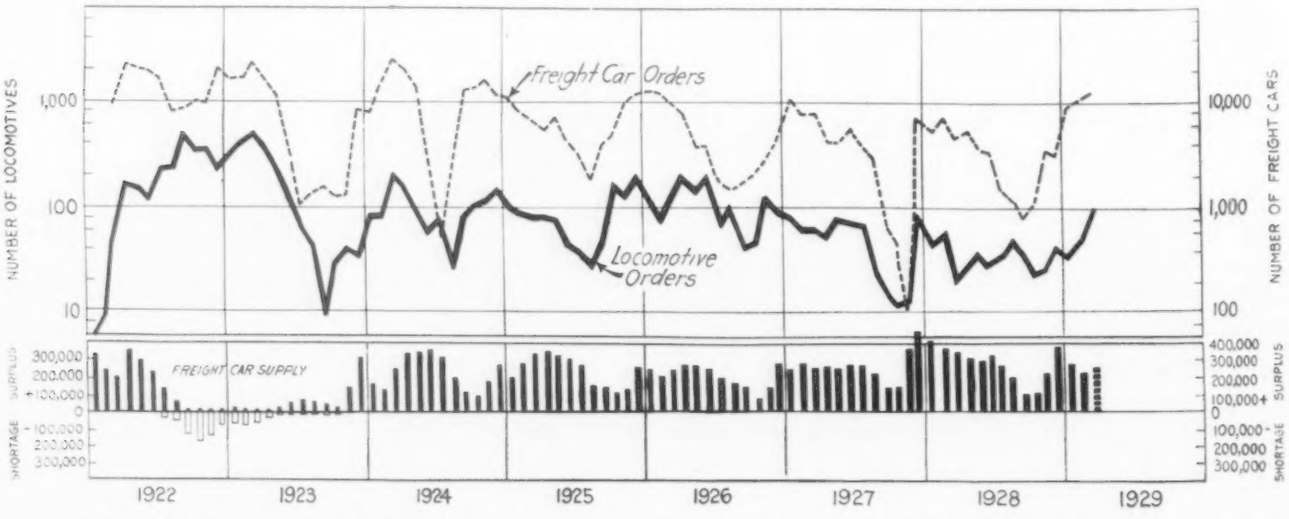
The trend of *building* continues downward. Contracts awarded showed less than the usual seasonal increase in March, and the 77,708,000 sq. ft. of floor space in such contracts compare with 88,090,000 sq. ft. last year. Our adjusted index for March is 105, against 114 in February and 119 a year ago. This is the lowest since May, 1927, and, except for that month, since early 1925. Nevertheless, structural steel bookings continue large, due to such large projects as subways, barges, and the like. A large gain in building permits in New York City also pulled the permit index up in March.

Railroad freight traffic in March showed a less than normal seasonal gain and in recent weeks car loadings have generally fallen behind the levels of 1926 and 1927. The volume, however, is greater than a year ago and the carriers have been able to increase their net earnings, so that railroad buying of steel promises to continue fair for the near future.

Many Industries Showed Declines

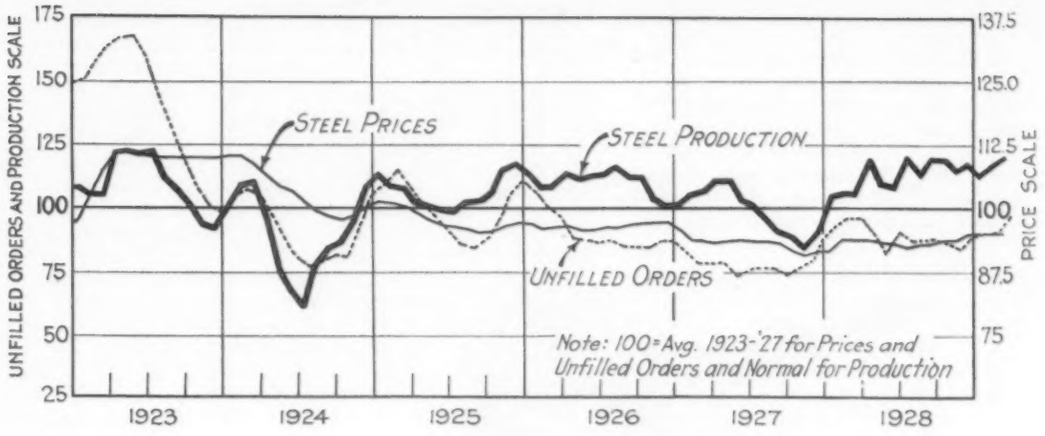
General Manufacturing, excluding iron and steel and automobiles, decreased a little in February, which illustrates how important a few basic industries are in affecting the "index" of manufacturing production. Declines in the Government's adjusted indexes were reported for textiles, food products, lumber, leather and shoes, cement, brick and glass and tobacco. February, however, was an unusually short month and the boom in metals and machinery is not yet over. Machine tool orders in February reached a new peak.

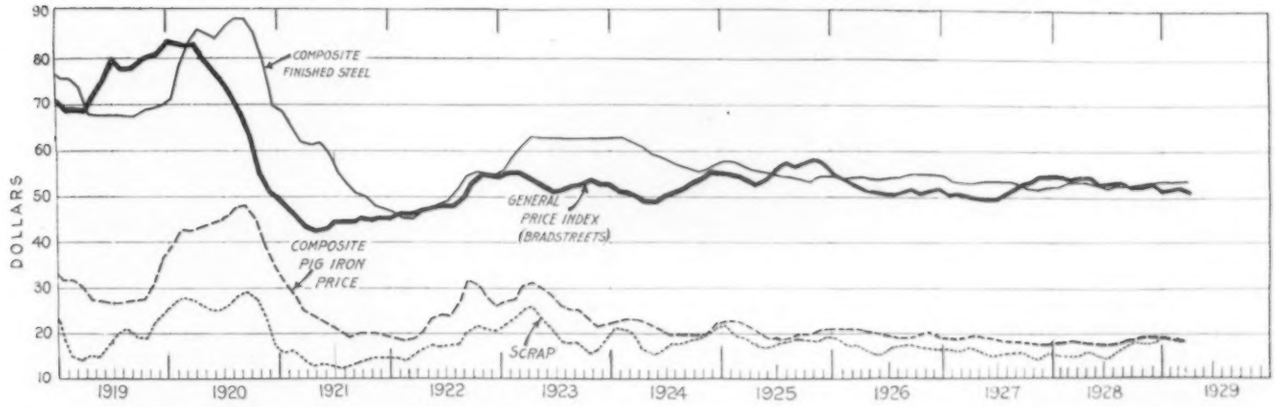
Mining activity continued upward through February, but a large decline in coal production in March probably will mean a decline in the mining in-



Railroad Car Orders Are Improving Markedly and Locomotive Orders Are on the Up-Grade. But the surplus of cars is so large that there is no indication of immediate need for heavy purchases

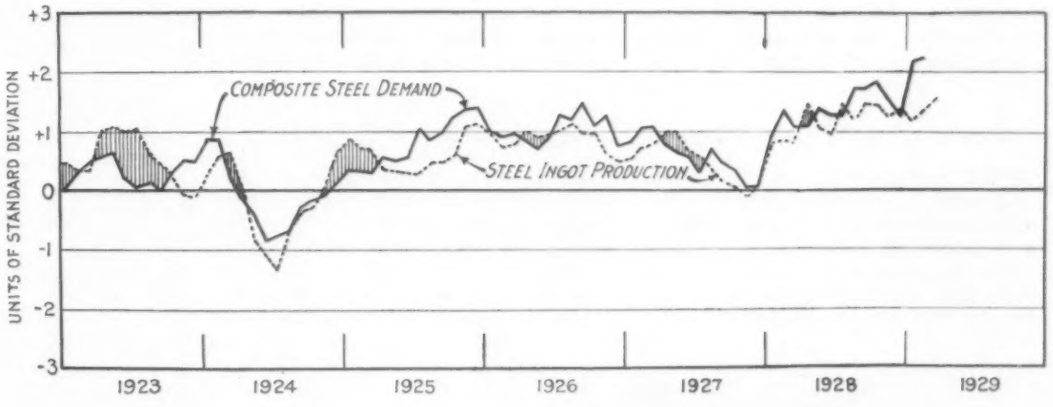
Steel Production in March Was 19.9 Per Cent Above Normal Requirements. Prices may have reached a peak. Unfilled orders showed a substantial gain





Commodity Prices Have Been About on a Level with Finished Steel for Some Time, but Latterly Finished Steel Has Been Forging a Little Ahead. Pig iron prices are below a normal relationship with scrap

Composite Demand, High in January, Has Gone Still Higher. Steel ingot production (adjusted) shows the longest continuous high - level movement since the war



dex for that month. Oil production continues to rise, but drilling activity has rounded off and is likely to decline, thus affecting the demand for casing pipe.

The purchasing power of the *farmers* is much below the levels of last summer, chiefly owing to a decline in farm prices as compared with non-agricultural prices. Little definite information exists as to the crop outlook, except that intentions to plant indicate an increase in acreage of nearly 2 per cent over last year, and winter wheat and oats are reported to be in very good condition. The outlook appears to be fairly good.

Exports of iron and steel increased in February, reaching the highest point (considering the season) since early 1921. Exports have not yet been affected by the decline in foreign loans, though it still seems probable that this factor will have its effect in time.

The net result is that a continued large demand for steel is indicated during the next month or two, but the peak seems to be near at hand and a moderate decline will probably be evident by mid-year.

Railroad Buying Much Better

A GOOD rate of railroad equipment buying continues. Freight car orders have been large, and locomotive buying is on the upgrade. This is the first time since 1924 that at the end of March one could say that the trend of equipment orders is upward.

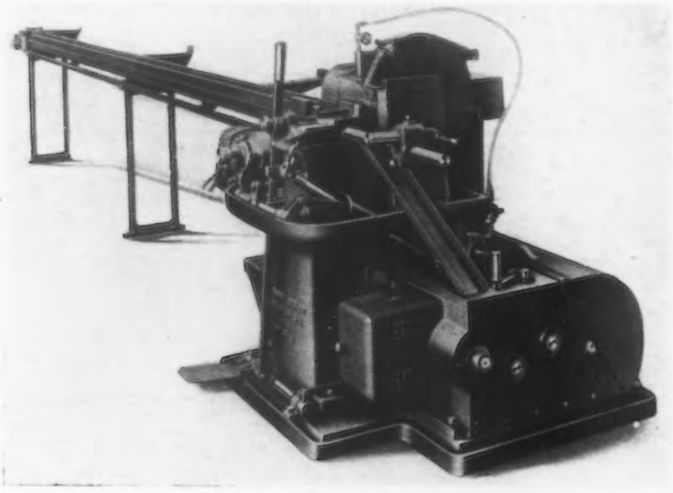
In the case of freight cars, the orders for the first quarter were the best reported for that period since 1924. The upward trend, however, appears to have become less pronounced and a seasonal decline is likely from now on through August. Buying of locomotives, though not in large volume, shows a more persistent upward trend. In fact, this trend is the most pronounced since early 1922, and it seems likely to carry on for two or three months at least. Locomotive shipments have been little affected as yet, but the small increase in March doubtless marks the beginning of a real upturn that will last into the second half of the year.

(*Concluded on page* 1128)

Automatic Cut-Off Saw Operates at High Speed

AUTOMATIC power stock feed and automatic clamping vise and trip have been provided on the high-speed cut-off saw illustrated, which was designed by the Cochrane-Bly Co., Rochester, N. Y., for cutting brass, copper and aluminum bar and tubing, hard rubber, bakelite and wood strip. The machine has capacity to cut a 2-in. copper bar; 3-in. brass bar and 4-in. brass or copper tubing; also flat bars and extruded shapes. The design permits use of high-tempered saw blades.

Movement of saw carriage is adjustable from ½ to 4¼ in., and speed ranges from 5 to 50 strokes per min., with standard speed gearing. Provision is made for much faster operation on small special work. The saw carriage is mounted on dovetailed ways, and is provided with adjustable taper gib to compensate for wear. The spindle is heat treated, and mounted in dust-proof Timken roller bearings. The drive from the motor is by silent chain and an idler sprocket is employed to absorb slack and compensate for variation in centers due to carriage movement. Motors of constant, variable or multiple-speed type can be used to provide the best cutting speed for various materials.



The Stock Feed and the Clamping Vise and Trip Operate Automatically. The drive from the motor is by silent chain and idler sprocket

Swinging Table Extends Range of Disk Grinder

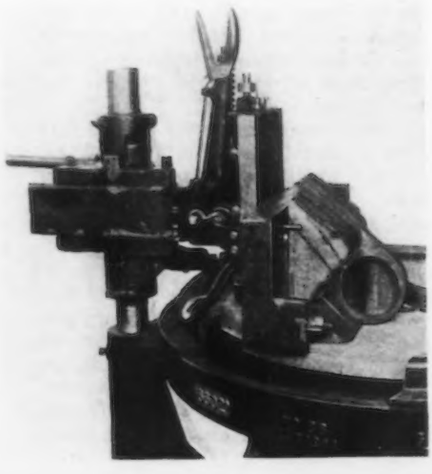
TWO surfaces of a casting may be ground in accurate relation to each other by means of the hand-operated swinging work-table here illustrated, which is made by the Gardner Machine Co., Beloit, Wis., for use on its No. 86 30-in. horizontal disk grinders. One face of the casting may be ground free-hand until flat, and the other face ground in accurate relation to it by placing the piece in a suitable fixture carried by the work-table.

As the illustrations show, the table pivots on a shaft that is carried in a bracket fastened to the machine base. The guard ring of the machine is cut out to permit swinging the work-table across the grinding wheel. Two handles are provided for swinging the work-table over the wheel and a locking hand-lever serves for raising and lowering the table to the grinding wheel. Spring tension furnishes the pressure necessary to hold the work against the wheel.

When in normal grinding position, the work-table forms an angle of 90 deg. with the surface of the grinding member. Longitudinal adjustment of the table up to 7 in. is obtained by means of a horizontal bar slide and vertical adjustment up to 4 in. by raising or lowering the rocker box on the pivot shaft. The top of the work-table measures 8 x 14½ in.

In grinding the gasoline engine crankcase shown herewith, the bottom is first ground free-hand until flat, the piece then fixtured as shown, and the side ground square with the bottom, within 0.005 in. The production is 25 pieces per hour.

The Swinging Work-Table Permits One Face of the Work to Be Ground Freehand Until Flat and a Second Face to Be Ground in Accurate Relation to the First. The arrangement may be seen in close-up view at right



Cast-Grid Rheostats

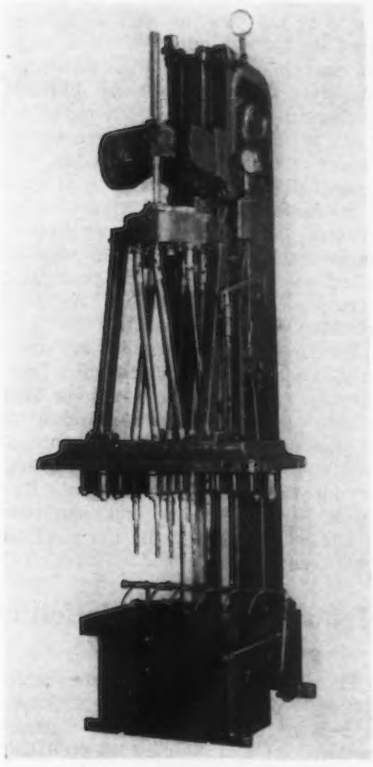
CONTROL of current through plating solutions is promoted through a new rheostat brought out by the Columbia Electric Mfg. Co., 1292 East Fifty-third Street, Cleveland. This has a cast-grid resistor mounted back of the panel, where it is readily accessible but secure from damage. The rheostat is of the parallel resistance type and designed to afford regulation of both the voltage and the current—the latter according to generator voltage and character of plating being done.

These cast-grid rheostats are ruggedly built, to withstand plating fumes and acid. The operating panel is of heavy asbestos board. The knife switches are all oversize and the whole unit is built to withstand an overload.

For 6-volt circuits there are nine capacities offered, from 400 to 3000 amp. Each unit includes voltmeter and ammeter, together with rheostat with individual tank control. The six switches give a large number of steps of regulation.

Multiple-Spindle Drill with Hydraulic Feed

OILGEAR feed, Texrope drive, vee guides for the slide and column, One-Shot lubricating system, and patented vertical adjustment of the spindles are features of a new universal-joint multiple-spindle drilling machine that has been added to the Hole Hog line of the Moline Tool Co., Moline, Ill. The machine has capacity



The Motor and Feed Pump Are Mounted in a Cored Space in the Top of the Column. Spindles Are Adjustable Vertically

for drilling 12 11/16-in. holes in mild steel.

The column, of deep box section, is bolted to the reservoir base, the top of which carries a tee-slotted worktable. The upper part of the column is cored to accommodate the motor, which is adjustable for tightening the Texrope belts that drive the speed mechanism and the flanged Oilgear pump directly beneath it. A 10-hp. 1200-r.p.m. motor is recommended.

The drive is through spiral gears to the main vertical drive shaft, and then through spur gears to individual drivers in the circular head, from which the power is transmitted to the drilling spindles through universal joints. The machine is equipped with a driving unit for 12 spindles, although in the case of the set-up illustrated only six of the 12 spindles are employed. Long drive shafts are intended to minimize the angularity and assure longer life to the joints. This construction also permits the use of a long bearing of slide on the column, this bearing, of double-vee type, being 12 in. wide and 44 in. long. The Oilgear hydraulic feed pump is the QS type and has a flange to permit inserting within and bolting to the side of the column. A 4½ x 24-in. cylinder is mounted at the top of the column as shown. The feed is adjustable and its automatic working cycle is controlled by the lever at the front of the machine.

Spindles are adjustable vertically to compensate for wear of drills, the adjustment being by means of a patented screw and gear self-locking device that is operated by means of a key. The minimum and maximum distance from the spindle nose to the table is 4 in. and 28 in. respectively. The minimum adjustment of the spindles is 2⅛ in. The weight of the machine, which is designated as the 114-U, is 11,500 lb.

Side and End Milling Head for G & L Boring Machines

THE range of the Nos. 45 and 50 horizontal boring, drilling and milling machines built by the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has been extended by the development of a combination side and end milling head.

This attachment is of simple and rigid design and has been used effectively in milling the slideways and bolster plate surfaces of punch press frames and in similar work. It is bolted and doweled directly to the head of the machine in place of the back gear cover-plate, and can be quickly applied and removed. An eyebolt is provided to facilitate handling the unit by hoist.

Power for driving the milling cutters is received from the boring machine spindle. A Morse taper arbor equipped with a spur gear is placed in the spindle and the spindle extended until the gear meshes with a gear on the end of the worm shaft to which the small milling cutter is attached. The large cutter is driven from the small-cutter shaft through a hardened and ground alloy steel worm and bronze worm wheel, the speed of the large cutter being one-fourth that of the small cutter and the spindle.

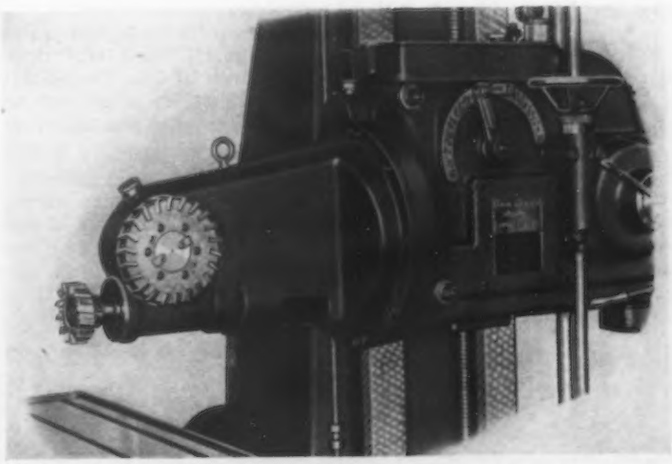
Heavy type combination radial and thrust ball bearings are used throughout, and these bearings together with the worm and other parts are packed in grease and completely inclosed. A draw-bolt that is accessible through the handhole is used for drawing the small milling cutter arbor into the socket. Thorough care is taken in the original fitting of the attachment to assure that the surfaces milled with both cutters will be in accurate alinement.

The milling head is made in two sizes with single or double side mills, and a similar attachment can be furnished with the large milling cutter arranged for vertical milling. Specifications for the smaller and larger attachments respectively are: Diameter of large cutter, 10 and 12 in.; diameter of small cutter, 5 and 6 in.; reach, 27 and 32 in.; and Morse taper for small cutter No. 5 and No. 6.

To Manufacture Dyett Keys

THE line of keys formerly manufactured by the Dyett Auto Products Co., Little Falls, N. Y., is now made by the Morton Mfg. Co., Muskegon, Mich., which recently acquired the patents and business of the Dyett company. These keys, now known as the Hi-Pro, are interchangeable with Woodruff keys and can be furnished with either full radius or flat bottom; feather and tubing styles are also made. Claims for this key include savings in labor of fitting and elimination of skilled labor in cutting the keyseats. The key will not roll or rock in the shaft and can be removed without injury to the key or keyseat.

The Cincinnati chapter of the American Society for Steel Treating inspected the plant of the Hamilton Coke & Iron Co., Hamilton, Ohio, on April 4, the trip taking the place of the usual monthly meeting of the chapter.



The Side and End Milling Head Is Arranged for Convenient Mounting. The milling cutters are driven from the spindle

Clandestine Violation Rule Assailed

Trade Commission Cannot Enforce Rule Against Breach of Ethical Codes, Says Manufacturers' Counsel

SPEAKING before the Purchasing Agents Association of Chicago, April 11, on "The Federal Trade Commission and the Anti-Trust Laws," John C. Gall, associate counsel, National Association of Manufacturers, declared that the so-called "clandestine violation" rule of the Federal Trade Commission is, in contemplation of law, a nullity, and predicted its early repeal. He also said that repeal of the Sherman anti-trust law was neither necessary nor desirable, and pointed out that the American Federation of Labor is the principal advocate of repeal so that organized labor can be free of legal restraint in carrying out all its objects.

Mr. Gall said in part:

"I have been asked whether, in my opinion, the trade practice conference is a desirable thing. My answer is that a trade practice conference is not necessarily either good or bad. A combination to lynch is a mob; a combination to extort money is a 'racket'; a combination for prayer is a church. So, too, the trade practice conference may be an instrument for good or for evil.

"These conferences have gone through a process of evolution. In their first stage they were simply meetings for the purpose of ascertaining the opinion of the industry itself as to what practices were unfair and therefore condemned by the Trade Commission Act as unlawful. The opinion of the industry was expressed through the adoption of resolutions declaring certain practices to be unfair methods of competition. These resolutions, taken together, were the 'law merchant' of the industry.

"In the second stage, industries adopted resolutions condemning as unfair numerous trade practices which did not involve the elements of fraud, deceit or oppression which are universally regarded as the earmarks of unfair competition. These resolutions the commission placed in a second group, and received merely as 'expressions of the industry.' It was understood that the latter were binding only in conscience and not in law.

"The third stage was entered with the adoption by the commission of the famous clandestine violation rule. This rule recognizes that the breach of Group 2 resolutions is not in and of itself an unfair method of competition; it asserts, however, that a secret or clandestine violation of a Group 2 resolution, by one who has openly subscribed to it, is an unfair method of competition and will be punished by the commission as such.

"The clandestine violation rule is not only unwise, it is, in contemplation of law, a nullity. I venture the prediction that within a short time it will have been repealed by the commission. It will never be enforced, because it cannot be. The commission has jurisdiction over unfair methods of competition in interstate commerce. This is the limit of its jurisdiction. It cannot translate the breach of an ethical agreement into an unfair method of competition, nor invest it with the characteristics of interstate commerce.

"Moreover, no jurisdiction is asserted by the commission over a violation of Group 2 resolutions by persons not signing the trade practice agreement. This places a premium on staying out of a trade practice conference. Nor is there any condemnation of one who, having subscribed to a resolution, openly and notoriously violates it. It is only the 'clandestine' violator that is threatened. The rule is clearly incapable of enforcement and should be withdrawn at once. Its repeal will again place the trade practice conference on a plane where it can be helpful to legitimate industry by substituting self-regulation for regulation by a statutory body."

Camite—a New Hard Alloy for Cutting Tools

THE Cleveland Automatic Machine Co., Cleveland, is announcing a new high-speed cutting alloy named Camite, the hardness of which approaches that of the diamond. The development of this alloy, which is said to be of distinctive composition and produced by a distinctive process, is credited to Emanuel Lavagnino, an American chemist with a background of Italian metallurgical training. The development work was done in the laboratory of the Electro-Alloys Co., which is closely allied with the Cleveland Automatic Machine Co.

Among the claims for Camite is a degree of toughness difficult to obtain in a material of such extreme hardness, the resistance to the shocks of handling being said to be noteworthy. The alloy is furnished in the form of tips, which are available in definite stock sizes, special sizes and shapes being furnished to order. These tips are brazed to suitable shanks or tool holders and ground to a cutting edge by means of special abrasive wheels.

Camite is marketed with claims of practically unlimited cutting speed, so far as existing types of machine tool equipment are concerned. It is also stated that in long test runs cuts of two or three times the customary depth have been made without detriment to the tool, as well as intermittent or "jump" cuts. While a degree of caution is advisable in handling a material of such extreme hardness, successful tests have been made with tools held at normal and greater distances from the cutting edge. The same results have been secured where a moderate amount of vibration was present, all of which is emphasized as indicating that Camite serves satisfactorily under tooling conditions normally experienced in American machine shop practice.

While entirely suitable for finish cuts, Camite is said to offer even greater advantages in roughing operations, particularly in hard materials or those having an abrasive content. Deep cuts have been made in castings having a high silicon content, hard steels, brass, bronze and aluminum at speeds that taxed the limits of the equipment.

Portion of 30-Ft. Chip Produced by Camite Tool Making a ¼-In. Cut in Chrome-Nickel Steel

Metal Trades Association to Meet April 24-25

The National Metal Trades Association, whose annual convention will be held at the Drake Hotel, Chicago, on April 24 and 25, has adopted as a keynote of the meeting, "Problems and Progress in Industry," and under this heading a number of speakers will contribute unusual features to the program. "Problems and Progress in Transportation" will be discussed by Elisha Lee, Pennsylvania Railroad, who will describe the entry of railroads into the field of aerial transportation; G. W. Vaughn of the Wright Aeronautical Corporation will discuss "Problems and Progress in the Air," and will cover the subjects of precision manufacturing, together with large-scale production, of airplane engines; Dr. Harry Meyers of the Frigidaire Corporation will talk on "Problems and Progress in Employee Relations," and the same subject as applied to another type of plant will be covered by Sterling Morton of the Teletype Corporation.

Among other vital topics of the meeting are: "How Long Will Prosperity Last?" by Dr. Thomas Nixon Carver, Harvard University; farm relief legislation, to be discussed by Wheeler McMillan, editor of *Farm and Fireside*. Walter Gordon Merritt, counsel for the League of Industrial Rights, will talk on labor legislation. Other scheduled speakers are Otto P. Geier, Cincinnati Machine Tool Co.; C. R. Gardinor, International Silver Co., and J. D. Cunningham, Republic Flow Meters Co.

Superior Steel Control Goes to Bankers

Controlling interest in the Superior Steel Corporation, Pittsburgh, has been acquired by New York banking interests. Frank R. Frost will continue as president, and no changes in the personnel are contemplated. The company has lately had considerable success in the rolling of rustless iron and copper-coated strips. This rustless iron is being used in the manufacture of automobile trim and automobile hardware, and, under the new control, its advantages will be fully exploited. The company will also continue the manufacture of commercial steel strips. James H. Hammond has hitherto been the dominant interest in the management of the company.

Criticism of Proposed Coke Specifications Wanted

Sub-committee VIII on foundry coke specifications of committee D-5 of the American Society for Testing Materials at a meeting in Chicago, March 21, discussed, at some length, the question of revision of specifications for foundry coke. It is a problem to revise the specifications so they will include all possible grades of coke that might be used in the foundries without seriously disturbing present commercial terms or without making the specification so detailed as to be burdensome. It was finally agreed that the new coke specification should be based on a contract statement as to the several properties of the coke to be specified, and that the specification should contain only the tolerances which would apply to these properties mentioned in the contract. Tolerances proposed are as follows:

Ash 5 per cent of the specified ash content, plus 0.25 per cent ash.

Sulphur 10 per cent of the specified sulphur content, plus 0.05 per cent S.

Volatile matter 10 per cent of the specified volatile content, plus 0.10 per cent volatile.

Shatter test, tolerance of 5 per cent flat.

Moisture—limited to 3 per cent maximum in all cases, the samples being taken as loaded.

The matter of porosity and fineness was considered, but porosity was not believed by the committee to be of any special value in the specifications and it was not considered feasible to sample for fineness in the "as received" condition.

The combustion test was discussed at length and the committee is endeavoring to secure sufficient data on this to justify including it in the specification as it seems to hold promise of considerable import in foundry coke testing.

To illustrate the working of the tolerances, a 10 per cent ash contract would allow a variation of 0.75 per cent ash, whereas a 7 per cent ash contract would allow only 0.60 variation. A one per cent sulphur contract would allow 0.15 per cent sulphur variation, whereas 0.50 sulphur contract would only permit 0.10 per cent variation.

The sub-committee publishes this report of the meeting in the hope that all interested parties will send in their criticisms, to J. T. MacKenzie, chairman of subcommittee VIII on foundry coke specifications, American Cast Iron Pipe Co., Birmingham Ala.

Giddings & Lewis Company Headed by H. B. Kraut

Reorganization and refinancing of the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., mentioned in THE IRON AGE of April 11, page 1056, has been completed with the election of directors and officers. H. B. Kraut, formerly vice-president and general manager, has been elected president and chairman of the board of directors. W. J. Radcliffe, president E. A. Kinsey Co., machine tools, Cincinnati, is first vice-president; A. T. Brenner, Fond du Lac, second vice-president; F. W. Chadbourne, secretary, and G. P. Heathcote, treasurer. Additional directors are L. H. Swind, president, Swind Machinery Co., Philadelphia, and T. E. Ahern, F. H. Boyle, T. W. Meiklejohn and C. H. Thornton, Fond du Lac. This group has acquired the controlling interest held since 1910 by Fred J. Rueping and the Rueping Estate, Inc., Fond du Lac.

H. B. KRAUT

The new president, Mr. Kraut, has been associated with the Giddings & Lewis Machine Tool Co. since 1924, when he became vice-president and assumed the general management in behalf of the Rueping interests. He is a native of Germany and a graduate of Munich Institute of Technology. He came to the United States in 1906 and two years later became connected with Joseph T. Ryerson & Son, Inc., Chicago, in charge of the operating end of its machinery department. He had supervision of foreign sales and traveled extensively abroad during 16 years' association with the Ryerson company.

It is announced that K. F. Gallimore continues as chief engineer, W. E. Rutz as works superintendent, and Carl Gebuhr in charge of sales.

Eastern Steel Co. Issues Receiver's Statement

Edward L. Herndon, receiver for the Eastern Steel Co., Pottsville, Pa., has published a statement of the financial condition of the company as of Dec. 31, 1928, together with a consolidated statement from Jan. 1, 1927, to the end of 1928. Sales of rolled products during that period amounted to $6,868,934.95 and bridge shop sales totaled $286,939.39. The manufacturing profit was $320,974.67, before allowance for depreciation, etc., and the net profit during the receivership before allowance for depreciation of plant and equipment and interest on the company's indebtedness was $112,589.80. The company's liabilities, as of Dec. 31, 1928, were $2,673,153.60, compared with $3,416,688.43 on Jan. 8, 1926.

Greenville Steel Car Co. To Build Cars

The Greenville Steel Car Co., Greenville, Pa., has announced through its president, F. D. Foote, that it has decided to engage in the building of new steel cars, having confined its activities since it was organized in 1913 to the repair of railroad cars and the building of specialties such as the Clark and Differential air pump cars. The first order received for new cars was from the Erie Railroad, for which the Greenville company will build 250 70-ton gondola cars.

Changing conditions, the announcement says, are responsible for the change in manufacturing policy. The railroads, it is stated, are now repairing so many cars in their own shops that they have taken over a large part of such work, and many of the companies which build new cars have solicited repair work in the past few years to keep their plants engaged in the absence of large buying of new equipment.

Plant of Standard Rail & Steel Co., Madison, Ill., has been sold at auction to Hyman-Michaels Co., Chicago, and will be operated under the direction of its St. Louis branch, of which William Rosenthal is manager. Hyman-Michaels Co. will continue to operate the Humboldt plant at 7000 North Broadway, St. Louis, which will be devoted largely to handling car material, while Madison plant will take care of relaying rails for the St. Louis territory. Some new machinery will be installed at Madison plant.

Lecture on Aluminum for Steel Treaters

An illustrated lecture on "Aluminum Alloys Used in Aircraft" will be delivered before the April meeting of the New York Chapter of the American Society for Steel Treating, Monday evening, April 22. It will be presented by E. H. Dix, Jr., metallurgist, Aluminum Co. of America, New Kensington, Pa., and the meeting will be held at Rumford Hall, 50 East Forty-first Street, New York. The lecture will describe Alclad, aluminum pistons, aluminum furniture, aluminum railroad cars, and other applications. Mr. Dix's lecture will be preceded by the presentation of a film, "Story of the Heat Treatment of Steel" taken at the plant of the Hupp Motor Co., Detroit, and prepared by the United States Bureau of Mines.

American Steel Engineers Leave for Russia

A group of steel plant engineers, who have become associated with the Freyn Engineering Co., Chicago, together with several other members of the Freyn organization, sailed April 10 for Soviet Russia, where they will participate in the preparation of plans for and in the supervision of construction of 18 new metallurgical plants to be built within the next five years. They will also participate in the rehabilitation of 40 other existing plants. It is stated that the work will involve a total expenditure of about $1,000,000,000,

For the purpose of handling this work abroad, the Freyn organization has recruited a group of engineers who have had wide experience in American mills. Among the new members of the organization are:

Earl H. Collester, who has been associated with the Wheeling Steel Corporation in the capacity of coke oven superintendent and later general superintendent of its LaBelle works; with the Weirton Steel Co., and with the Koppers Co. in the construction of by-product coke oven plants.

L. R. Dwyer, who has been associated with the Central Alloys Steel Corporation as open-hearth superintendent; with the Broken Hill Proprietary Co. in Australia, and with the Lackawanna Steel Co.

W. S. Orr, who was formerly chief engineer of the Central Alloy Steel Corporation, and with the Jones & Laughlin Steel Corporation.

Walter W. Leck, who was formerly associated with the Scullin Steel Co. in the capacity of manager of mill department; with the American Tube & Stamping Co. as general superintendent of steel works; with the Bethlehem Steel Co. as superintendent of rolling mills, and with the Wisconsin Steel Co.

Lee H. Mandeville, who has been associated with the Acme Steel Co. as strip mill superintendent; with Columbia Steel Corporation as chief engineer; with Wickwire, Spencer Steel Co. as electrical engineer, and with the Pittsburgh Crucible Steel Co. as electrical engineer.

Frank Herzog, who has been associated with the Wickwire, Spencer Steel Co. as chief draftsman; with Donner Steel Co. as mechanical engineer; with Pittsburgh Seamless Tube Co. as chief engineer of construction, and with the Pittsburgh Crucible Steel Co.

Vance A. Cronk, who was associated in the construction of the new wide strip mill in the Middletown plant of the American Rolling Mill Co.; with the Columbia Steel Co. as assistant electrical engineer; with the Pittsburgh Crucible Steel Co. as assistant electrical engineer, and with the Ford Colleries Co. as electrical engineer.

J. V. McCartney, who has been associated with the Wilputte Coke Oven Corporation, Dwight P. Robinson & Co., the Youngstown Sheet & Tube Co., and the Illinois Steel Co.

This group, together with several members of the Freyn organization, will be headed by L. E. L. Thomas, vice-president, Freyn Engineering Co.

Scrap Dealers May Test Chicago License Tax

The Institute of Scrap Iron and Steel was requested by its Chicago chapter, at a meeting held in Chicago on April 11, to defend the scrap iron dealers of that city in the attempt on the part of the city to impose a license tax of $200 on scrap iron dealers. Benjamin Schwartz, director general of the institute, who attended the meeting, held a conference with the corporation counsel of Chicago on this subject. It is expected that a test case will be made to test the validity of this tax, which, in the opinion of the Chicago chapter, is unwarranted and unconstitutional.

Steel Mill Units For Hot Metal

One table in the report of the United States Census Bureau showing the steel mill operations for 1927 gives the number and size of the various types of furnaces forming the melting units in the different plants, and also the mixers. Details are given in our table, with average capacity figures worked out from the Census Bureau totals.

It will be noted that the total number of melting furnaces was 1517, a gain of 26 from the 1491 of 1925. This gain was most pronounced in the electric furnace units, which increased by 23 per cent in number and about the same proportion in total daily capacity. There was a gain of nine in the number of open-hearth furnaces, accompanied by a gain of 10.4 per cent in total reported capacity. The increase in basic open-hearth furnaces was mainly in larger sizes of furnaces, as there was a reduction of five units in the total number but a gain of 11 per cent in daily capacity.

Further elimination of Bessemer converters is noted, with a drop of 9 per cent in number and nearly 14 per cent in capacity. The same is true of crucible furnaces, which dropped off more than one-fifth in the two-year interval. There was a reduction in the number of metal mixers but a gain in capacity, with a substantial increase in the average capacity per mixer.

Gain in Steel Corporation's Orders in March

Another large increase in the unfilled orders on the books of the United States Steel Corporation was registered in March. The gain was 266,377 tons. On March 31 the total unfilled business was 4,410,718 tons, compared with 4,144,341 tons on Feb. 28. A year ago the unfilled total was 4,335,206 tons.

The current figure is the largest for any month since February, 1926, when 4,616.822 tons was reported; it is larger than any previous March 31 figure since the 4,863,564 tons in 1925. The March increase compares with one in February of 34,854 tons, one in January of 132,775 tons and one of 303,712 tons in December. There was a decrease in November of 78,030 tons. The table gives the reported figures for the last 15 months.

	1929	1928
Jan. 31	4,109,487	4,275,947
Feb. 28	4,144,341	4,398,189
Mar. 31	4,410,718	4,335,206
Apr. 30	.....	3,872,133
May 31	.....	3,416,822
June 30	.....	3,637,009
July 31	.....	3,570,927
Aug. 31	.....	3,624,043
Sept. 30	.....	3,698,368
Oct. 31	.....	3,751,030
Nov. 30	.....	3,673,000
Dec. 31	.....	3,976,712

FURNACES EMPLOYED IN STEEL MILLS
(Gross Tons)

	Daily Capacity, 1927			Daily Capacity, 1925		
Open-Hearth:	No.	Total	Average	No.	Total	Average
Basic	982	151,020	153.8	987	136,266	138.1
Acid	168	8,638	51.4	154	8,433	54.8
Both	1,150	159,658	139.0	1,141	144,699	126.8
Converters	93	47,767	513.6	102	55,289	542.0
Electric	219	5,357	24.4	178	4,383	24.6
Crucible	55	296	5.4	70	390	5.6
Total	1,517	213,078	140.4	1,491	204,761	137.3
Mixers*	88	46,738	531.2	93	44,736	481.0

*Figures show capacity at one filling.

Latin America—A Fast Growing Market

Imports from United States Have Doubled in Volume and Trebled in Value Since Before War, Says L. A. Downs

"BEFORE the World War our investments in Latin America were a little more than a billion dollars," said L. A. Downs, president Illinois Central System, in an address on "Our Commerce With the Other Americas," delivered at Baltimore, April 18, at the sixteenth convention of the National Foreign Trade Council. "Since then United States capital has been flowing in a steady stream into Central and South America and the West Indies, until today our total investments in Latin America exceed five billions of dollars. There are now as many United States dollars at work in Venezuela alone as there were in the entire South American continent 16 years ago. In some of these countries United States investments exceed those of any other country.

"Then, too, we are less dependent upon competitors for shipping facilities. In 1913 only 8 per cent of our commerce with South America was carried in United States vessels. In 1926 it was 46 per cent.

"In these ways, and due largely to these factors, the United States has come to occupy the dominant position in nearly every commercial center of Latin America. Our exports to Latin America have just about doubled in volume and trebled in value since before the war, and the Latin American countries now provide the United States with markets for nearly a billion dollars' worth of goods annually. Out of every five dollars' worth of products exported by this country, Latin America is taking nearly one dollar's worth.

"Of our ten leading foreign markets for heavy iron and steel products, five are in Latin America. The same is true of industrial machinery. Of our ten leading foreign markets for cotton cloth, seven are in Latin America. This region also provides the United States with some of its principal markets for Southern pine lumber, automobiles, electrical machinery, petroleum products, leather and rubber goods, lard, lumber and wood products, cutlery, hardware, metal furniture, office appliances, galvanized wire, roofing material and a wide variety of other manufactured products.

"Our extensive commerce with Latin America is on a reciprocal basis. Our Southern neighbors need our markets as much as we need theirs. Out of every three dollars' worth of products exported by Latin America, the United States takes more than one dollar's worth. We are buying more than half the total exports of several Latin American countries, and our total purchases in the Latin American market, amounting to more than $1,100,000,000 annually, exceed those of Great Britain, Germany and France combined. The United States is by far the best customer Latin America has today."

Plates Move by Water from Chicago to Milwaukee

Shipment of steel plates by water from Chicago district mills to the pipe and automobile frame plant of the A. O. Smith Corporation, Milwaukee, has been inaugurated with the opening of navigation on lower Lake Michigan. The first consignment, 3000 tons of steel, was delivered in Milwaukee last week by the whaleback Henry Cort. The shipping of steel by barge from Chicago to Milwaukee was predicted at a recent hearing conducted by the Interstate Commerce Commission on freight rates between Chicago and Milwaukee and points to the north.

Production schedules in April at the Smith plant call for the use of 75,000 tons of steel plates from Chicago mills. In addition, 25,000 to 30,000 tons of strip steel will be used in the automobile frame department.

A. E. Hetherington, traffic manager for the A. O. Smith Corporation, states that water shipments are an experiment, and their continuation will depend upon the savings effected as against rail shipments.

Airplanes have been put into service by the Smith corporation to aid in the development of the pipe market. Planes will be used primarily to carry inspectors to various oil and gas centers where pipe lines are being constructed. Recently a Smith plane was piloted 6000 miles in eight days of flying, during which time the plane was in use only 8 hr. a day.

Introduce Lugged Brick for Refractory Linings

A new method of building refractory linings, calling for the use of lugged refractory brick, has been introduced by the Covell Corporation, a recently organized company with headquarters at 1600 Walnut Street, Philadelphia. The lugs provide openings in the brick which are filled with refractory joint material by a cement gun. This method, called Co-Weld-Cor, reverses the old tradition that "the thinner the joints the better the wall." The bonding material, as blown into the joints, is very dense. In fact, it is said that the joints become stronger than the brick itself.

Since little attention need be paid to the fitting of the blocks, a considerable saving in time and labor costs is assured, it is stated. The method can be used for lining cupolas, blast furnaces, open-hearth furnaces, coke ovens or other units in which refractory brick is used.

The same system is to be applied to masonry construction in general. The trade name Weldcrete is used to cover all forms of masonry under the Covell Corporation patents, while the refractory linings are to be known by the special name Co-Weld-Cor.

Charles E. Covell, formerly with the Austin Co., Cleveland, is president of the new company. Earl D. Covell, inventor of the method of construction, is vice-president. Other officers are: Vice-president, Morris Kind, president, Hercules Cement Co.; secretary-treasurer, Arthur B. Murphy. Directors include Harry L. Cox. Marion Steel Shovel Co.; William Fulton Kurtz, president, Colonial Trust Co., Philadelphia, and Earl J. Van Sciver, treasurer of the Van Sciver Corporation, Philadelphia.

A. P. Lee, for the past seven years in charge of the foundry of William Sellers & Co., Inc., Philadelphia, has been made manager of the ceramic and refractory division.

Good Gain in Automatic Stoker Sales

WASHINGTON, April 16.—Mechanical stokers to the number of 117, with rating totaling 42,432 hp., were sold in March, against 80, with 31,554 hp., in February, according to reports received by the Department of Commerce from 10 leading manufacturers. Sales in March of last year were 123 stokers, with 43,425 hp. Of those sold last month, 42, with 6369 hp., were to be installed under fire-tube boilers and 72, with 36,063 hp., under water-tube boilers.

Automobile Output Expected to Decline

Several changes in automobile prices have been made since the first of the year but no definite trend, either upward or downward, is to be traced thus far, according to *Automotive Industries*. While the record-breaking production of the first quarter has caused talk of over-production and possibilities of subsequent downward price revisions, an investigation has revealed that very few manufacturers consider stocks in dealers' hands to be excessive.

Manufacturers have continued high production schedules well into April, feeling justified in view of sustained favorable sales reports from the field, but some decline may reasonably be expected before the second quarter is ended. It is considered practically certain that output in the third quarter of this year will drop behind that of the corresponding period last year, which was abnormally high.

Employment High—Real Wages Rising

Economic Status of Labor Improving, Says Conference Board—Earnings in Step with Living Costs

EMPLOYMENT in the manufacturing industries of the United States at the beginning of the current year on the average was higher than it had been at any time since the second quarter of 1926, the "banner" year of manufacturing production in the post-war period up to 1928, with indication that the rising tendency is continuing, according to the National Industrial Conference Board, New York.

Further evidence of prevailing healthy economic conditions is the fact that wage earnings in the manufacturing industries for the past five years have shown remarkable stability with a slightly increasing trend, while living costs during the same time showed a slight decline, further contributing to the improvement in the economic status of the American industrial worker. As a result, the purchasing power of average weekly earnings per worker, that is, the average "real weekly" earnings of workers in industry at the beginning of the current year, were nearly 6 per cent, and the average "real hourly" earnings per worker 5 per cent, greater than at the beginning of 1927.

Average "real weekly" earnings were 38 per cent, and "real hourly" earnings 45 per cent, greater than in 1914.

In citing the average weekly earnings per worker in manufacturing to be $27.78, as it was during January of this year, the Conference Board cautions against comparing such average with the average minimum cost of maintaining a fair American standard of living for the family of an industrial worker. While changes in the average cost of living for the country as a whole can be measured on the basis of retail prices, data for the actual average cost of living for one person or a family of given size for the country as a whole are not available, having been ascertained only for individual localities and for isolated periods of time. Living costs for an industrial family of wage earner, wife and two children were found to vary from approximately $28 to $32 a week in 12 industrial communities, including very small and the largest of industrial centers in the United States.

The wages of women workers are generally lower than those of men, and approximately one-sixth of those on whose earnings the average figures cited are based are women. The married men as a class are older and, as a rule, more skilled and experienced, while half of the unmarried male workers, whose earnings figure in the average, are boys of less than 20 years of age. These considerations, the board points out, are often ignored in discussions on the subject, but "go far to establish a strong presumption that industrial workers with family responsibilities have earnings sufficient to meet their obligations."

Robinson & Orr, Pittsburgh, dealers in rails, relaying rails and track supplies, on April 18 will remove their offices from 419 Wood Street, where they have been located for over 35 years, to the Columbia Building, 248 Fourth Avenue.

Film Shows Operation of High-Frequency Induction Furnace

DEVELOPMENTS in the rapid melting of steel, metals and alloys in high-frequency induction furnaces have been creating considerable interest in the metallurgical world. An Ajax-Northrup furnace is used, built by the Ajax Electrothermic Corporation, Trenton, N. J., which has prepared a motion picture film, to show how the electric energy acts on the charge in the furnace. A few sections of the film are here reproduced. Furnaces are shown in operation in the company's plant and in that of the Edgar Allen Steel Co., Sheffield, England, and the pictures include views of the 150-kw., 600-lb. furnaces at the plant of the Heppenstall Forge & Knife Co., Pittsburgh, and two 1000-lb. furnaces at the plant of the Babcock & Wilcox Tube Co., Beaver Falls, Pa. There is also reproduced the application of the coreless induction furnace to the heating of metals for forging. The method of putting the linings in 500-lb. furnaces is illustrated by flashes of the operation.

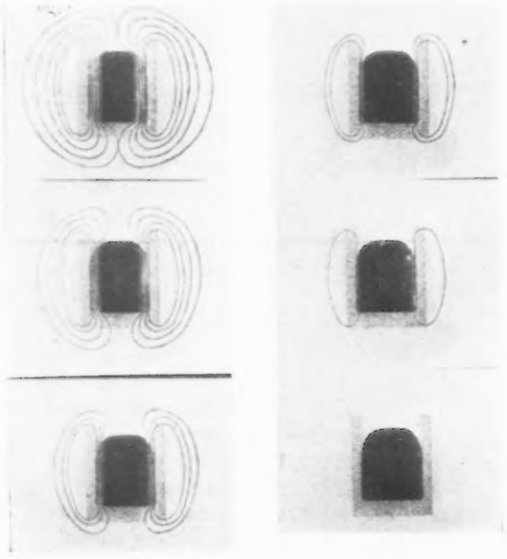


Fig. 1—"Lines of Force" on a Cross-Section of the High-Frequency Furnace

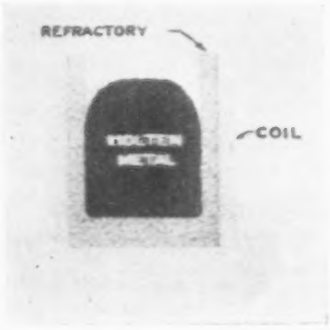


Fig. 2—A Cross-Section of the Furnace (Above)

Fig. 3—Section of the Ajax Furnace With Molten Charge Showing Resultant Pressure Causing Stirring (Upper Right)

Fig. 4—Succession of Lines Showing Stirring Motion (Right)

This Issue in Brief

To conserve heat and floor space the stands of new continuous bar plate and hot strip mill are so close together that part of the time the piece is in two stands at once. Thus, a very close control of speed is necessary and, after No. 4 stand, the stands are in two interdependent groups. — Page 1070.

* * *

Malleable iron annealing furnace temperature is controlled by means of gas return system. Some of the waste or flue gases are returned through the carbureter and burner in the holding period.—Page 1075.

* * *

Steel prices will at least hold firm for several months, says Dr. Haney. Pig iron is relatively cheap, while steel scrap is relatively dear, he says, in predicting scrap declines.—Page 1128.

* * *

What determines shrinkage of malleable iron? After an exhaustive research, metallurgist declares that the effect of carbon and silicon is very small, and that shrinkage is determined by temperatures and by several variables.—Page 1075.

* * *

Five per cent annual bonus given to all employees, not in the higher salaried positions, with five or more years service. General Electric Co. paid 7.5 million dollars extra compensation in 1928. Use of differential piece rate, bonus and group incentive systems is increasing. — Page 1127.

* * *

Predicts failure of Federal Trade Commission ruling that clandestine violation of trade practice agreement is "unfair competition." "Unwise and unenforceable," says lawyer. "Breach of an ethical agreement cannot be translated into an unfair method of competition."—Page 1090.

Malleable castings to be annealed in 24 hr. Electric annealing furnace will have three chambers, in two of which work will be held at temperature of 1850 deg. Fahr. The third will be 1550 deg. Fahr.—Page 1074.

* * *

Peak in steel demand is near at hand, says Dr. Haney. Continued large demand is indicated for next month or two, but a moderate decline will probably be evident by midyear.—Page 1087.

* * *

Iron castings made in cupola from 95 per cent scrap steel, 3.5 per cent ferrosilicon and 1.5 per cent ferromanganese. Average strength is 58,300 lb. per sq. in. "The secret is low carbon and high temperature," says foundry operator.—Page 1073.

* * *

New cutting tool alloy will make "jump" cuts without breaking. High-speed cutting alloy is almost diamond-hard, yet sufficiently tough to take deep cuts and to serve satisfactorily under normal tooling conditions.—Page 1090.

* * *

Machinability of cast iron is affected by quantity of moisture in the blast furnace. Less moisture means improved machinability, declares investigator, who finds that physical characteristics of pig iron persist through the cupola melting operation.—Page 1078.

* * *

Wide variation in casting cost estimates reveal need for simplified foundry cost system. Estimates based on "problem" submitted at foundry convention range from 4c. to 11c. a lb. Cost expert declares 8c. a lb. is the correct figure.—Page 1079.

Brass foundries can reduce melting loss by melting copper first, and later adding the low-temperature melting alloys.—Page 1081.

* * *

Upset forgings are as strong in the center as original stock. Comparative tests reveal that the spreading of the flow lines at the center of the upset forging does not lower quality.—Page 1077.

* * *

Heat treatment makes thin-walled bronze castings air-tight. Castings of 93 per cent copper and 7 per cent tin are likely to be porous, but heat treatment makes them sound.—Page 1077.

* * *

Facing with tungsten carbide alloy cuts rock drill costs almost 90 per cent. Material is coated on steel base under a carbon electric arc. Hardness ranges from 8.6 to 9.2, depending upon the amount of intermelt allowed by the welder between the base metal and the hard facing metal. —Page 1066.

* * *

What causes pinholes in surface of steel castings? Founders disagree. Some blame the sand, while others say the steel is responsible. An intensive investigation is advocated.—Page 1076.

* * *

Wall thickness and ductility of compressed gas cylinders automatically determined by testing machine. Volume expansion is measured at two pressures. Curve-drawing machine automatically records the data.—Page 1068.

* * *

To avoid white fracture in malleable castings, analysis should be under 1 per cent silicon and 0.17 per cent phosphorus. Melting temperature should be normal, and excessively high annealing temperatures should be avoided.—Page 1074.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

ESTABLISHED 1855

The Hoover Legend at Work

PRESIDENT HOOVER has been in the White House only six weeks, but already the Hoover legend, which we may define as a super-capacity for the solution of hitherto unmastered problems, has taken a firm hold on the popular thinking. Writing late in March of the social and economic problems of Porto Rico, Bishop Herbert Welch observed: "The economic level is exceedingly low, and it is to be hoped that President Hoover, with his fine insight into Latin-American affairs, may devise some plan by which this level can be raised and opportunity opened wider."

And only a few days ago the New York *Times*, which no one suspects of any such hero worship as might be easy for a bishop, fell in no less readily with the Hoover-can-do-it vogue. After discussing at length the great perplexity of the Government at Washington, fearful of an oil monopoly on the one hand and of the consequences of unchecked waste of our petroleum resources on the other hand, it winds up no less optimistically than the bishop:

> In this dilemma the public and the [oil] industry look hopefully to Mr. Hoover. He is an engineer; he knows about mineral deposits; he has been on the Federal Oil Board; he should be able to find means to prevent waste and monopoly as well.

Now if Congress could only be persuaded that with such an engineer in the White House the people will be well satisfied to see his policies take form in legislation! And if this legend of the engineer in the White House is so effective, why not send a few eminent engineers to Congress, especially to the Senate?

The Credit Controversy

AGRARIAN senators and representatives in Congress, but especially senators, are professing great concern in respect to the loans for carrying corporate securities in the New York stock market and are busily engaged in framing bills to correct what they consider to be an evil. In this, no doubt, they suffer from misunderstanding.

Investments and speculations in corporate stocks are absorbing a great deal of credit, to be sure, and ipso facto interest rates are high. It is deduced therefrom that such transactions are depriving industry of credit and consequently are hampering production.

In the same breath we are told that industry is prospering as never before and that production is surpassing all previous records. The statistical indices go a long way in support of the contention. But if industry is so prosperous, it follows naturally that it is not suffering from lack of credit.

Let us suppose that the stock market were suddenly deflated and the credit that it is using were released, what would be done with it? A large part of this credit is being extended by corporations, which are thus employing their surplus. Obviously they employ it in this way for the reason that they find it more profitable to do so than to use it in their own business.

If they should contemplate using it in their own business, the only thing they could do with it would be to build more plants. This would increase the demand for labor and material, but if their plant be already adequate, perhaps overbuilt, it would be an economic waste to provide a superfluity. Another thing that these corporations might do is to distribute their surpluses among their shareholders and let them spend it, and there is ground for argument that they have not been sufficiently generous in that way, but obviously if they should make an entire dissipation they would not have means for expanding business when later on that might be desirable.

Anyhow, these conditions have nothing to do with the woes of the corn planters and wheat-growers and there is nothing in them that ought to create excitement in the mind of an agrarian senator. The diversion of credit to the stock market may conceivably produce jealousy in the hearts of bond houses and likewise in those of speculators in real estate and in commodities, who do not like high terms for credit, but their dissatisfaction does not appear to be slowing up general business. The real concern in this juncture, it seems to us, is the fate of those persons who have used their credit for the purchase of stocks at more than their value, hoping to resell to other persons miscalculating more than themselves. It is an affair of Wall Street rather than of Main Street.

Gains in the Steel Producing Rate

PRODUCTION of Bessemer and open-hearth steel ingots this year has been 12 per cent above that in the same period of last year, the increase being almost exactly 1,500,000 tons. Production in the first three months of last year, 78 working days, was reported at 12,544,156 tons, while production in the first three months of this year is reported at 13,849,701 tons. Our comparison is made by adding for this year one day in April, to make an equal number of working days. It follows that production in the twelve-month period, 311 working days, through April 1, 1929, was about 3 per cent greater than production in the calendar year 1928 (also 311 working days).

That is enough to warrant a fresh survey of the rate at which steel production has been increasing.

For such a comparison one picks from the past not calendar years, but periods of 12 months of maximum production. Certain minor adjustments are requisite to arrive at comparable figures, a working day being added or dropped to make 311 days. Also, the old monthly production reports included electric and crucible ingots, not now reported monthly. As such production was 0.803 per cent of the total in 1925, 0.723 per cent in 1926 and 0.865 per cent in 1927, we add an even 1 per cent to the Bessemer and open-hearth production reported monthly, to obtain total production in the twelve-month period just ended, making the following comparison of total ingot production:

12 Months Through	Gross Tons
October 31, 1923	44,218,803
November 1, 1926	47,780,042
April 1, 1929	51,870,000

The increase in the first period, three years, was 8.05 per cent. The increase in the second period, two years and five months, was 8.56 per cent, a slightly greater increase in a somewhat smaller interval. These increases may be reduced to average annual rates of increment, making the first annual rate 2.61 per cent and the second 3.46 per cent.

There has been a feeling, not unnatural, that our recent pace in steel production has been too strong to last. This impression first arose last summer. July ran above June, when usually it is the lower month. The second half exceeded the first half slightly, when quite regularly it had been distinctly the other way about. The heavy production this year has accentuated the doubt whether the pace could be maintained.

This latest rate of increase, however, 3.46 per cent per annum, is not necessarily out of line. It merely represents a rate of doubling in 20.4 years. Steel production used to double in less than ten years. The production just accomplished in 12 months is only 71 per cent above the production in either 1912 or 1913, about 17 years earlier.

Of the 1,500,000-ton increase in ingot production in the first quarter of this year, over the same period of last year, about two-thirds is due to increased automobile production; but that large share is not to be attributed entirely to automobile production running exceptionally high this year. Part of the change is due to automobile production having run exceptionally light in the first quarter of last year. As supporting factors for the nearby future we have large freight car orders on books, which affected steel production but little in the first quarter; and fabricated structural steel lettings reported weekly since March 1 have been at an altogether exceptional pace.

Round Table Frankness

INTERCHANGE of experience at a technical gathering is usually freer the fewer the formalities. In recent years such pooling of ideas has been fostered by round table luncheons between the more or less formal sessions. Seven years ago, the American Electrochemical Society had its first luncheon discussion at a spring convention at Dayton, Ohio. With coats off, and with an intimacy associated with an after-dinner atmosphere, a large gathering of brass and copper melters exchanged opinions on common problems until late in the afternoon.

Enthusiasm engendered by this experience spread to the American foundrymen. They adopted the idea soon afterward—with such cumulative success that at Chicago last week five such luncheons were held. The round table questions and answers bring out information of a type that no set program at formal sessions can ever uncover. Without doubt the lunching get-together has won a permanent place in the programs of technical conventions.

Wider Utility for Die Castings

AMERICAN manufacturers are being offered an increasing, almost bewildering, variety of metals with which to work. Alloy steels, pearlitic and alloy cast irons, improved bearings and cutting materials, strong aluminum alloys, stainless metals and chromium plate—all these, together with improved qualities in the older materials, give the progressive machine builder resources undreamed of by the past generation. Into this situation, already complex, now come die castings, asking serious recognition as a material for construction.

Many, when they think of die castings, doubtless think of toy soldiers, lead bullets or pewter spoons. Soft metals are still cast in permanent molds (storage battery grids, for example) but the die-casting business has grown beyond these elementary stages. Others, when they think of die castings, may remember an epidemic of troubles when electrical equipment, cash registers and similar machinery of civilization were first sent to the tropics. Die castings which were eminently satisfactory in temperate England or New England swelled, blistered, cracked and generally went to pieces in the warm and humid climates. But the die-casting business soon found those alloys and impurities which had to be excluded from such regions, and now can readily make parts entirely stable and with satisfactory corrosion resistance.

Other common impressions about die castings are that an enormous number of castings must be bought because the dies cost so much, and second, that the castings themselves, while fine for things which carry no load (like a waffle iron or an instrument case) are made of such weak metal that they are entirely unsuitable for machine parts which must take even a moderate stress. The first of these is a matter of relativity—an intricate casting like a carbureter body requires an expensive die, but a die for such a thing as an outlet spout for a gasoline truck is of modest cost and can be spread over a reasonable number of castings.

So far as the strength, shock resistance and general load-carrying ability of die-cast metal are concerned, one can get a tensile strength of 30,000 lb. per sq. in. from several commonly used alloys. Castings of 35,000 lb. per sq. in. and even up to 45,000 lb. per sq. in. can be secured from special analyses. Such strengths are certainly high enough to be worthy of attention by designers of parts requiring definite duty. This matter of strength and permanence is being studied by an active committee of the American Society for Testing Materials; a comprehensive test program is under way, heartily supported by the lead-

ing producers. Its final report should do much to establish the die casting as an engineering material capable of carrying load, in addition to being an architectural substance useful for shape and finish.

Hangars of Cement, or of Steel?

NO matter what the steel industry may think about the nature of certain competitive activities by others supplying construction materials, it cannot accuse the cement people of being at all hesitant in entering new fields. As has been wittily said, if a man decided at breakfast to build a bird-bath in the garden, before lunch he would be visited by a good salesman, convincing him that it ought to be made of concrete.

A case in point is an airport competition, recently announced in double-page spreads in many journals. One of the leading cement companies is offering $10,000 in prizes for acceptable sketch plans for moderate sized airports. As the announcement plainly states, "the buildings and structural features of the airport shall be indicated as though constructed of Portland cement products wherever practicable." The prize is big enough to attract architects and engineers of considerable ability, and undoubtedly the winning designs will be copied widely in the near future. What with the hundreds of municipal airports under consideration, the lack of easily available information on the requirements of a commercial airport, and the growing tendency for mass production of engineering projects, it is certain that the winning plans in this competition will be closely duplicated dozens of times, and have much influence in future developments and adaptations.

Consequently, from the viewpoint of the cement industry, it was natural that Portland cement should be particularized as the preferred construction material. And lest any one rest satisfied that structural steel is the material par excellence for hangars, shops and miscellaneous sheds, let the reader ponder the following facts:

The enormous airship hangar of the United States Navy at Lakehurst is 803 ft. long, 264 ft. wide and 172 ft. high. The largest hangar in France is at Orly; it is 984 ft. long, 298 ft. wide and 194.5 ft. high. Did the latter use 5000 to 6000 tons of structural steel, as was required at Lakehurst? It did not. It was made of reinforced concrete.

Foundry Industry Forging Ahead

NO one who attended the foundrymen's convention at Chicago last week could fail to catch the new spirit which prevails—a will to achieve new things and to perfect, or to discard, old methods.

In the gray iron field a symposium on high-test iron revealed a wide range of improvements, among them the production of cast irons having tensile strengths up to 70,000 pounds per square inch and other superior qualities. In the malleable iron sessions an impressive showing was made of recent advances in shortening the time of the annealing period. Steel foundries gave proof of progress in metallurgy and in other phases of a broad campaign to meet the competition of other products.

Last week's gathering seemed also to indicate that an exhibition serves to round out a foundry convention. Some evidence is available because, two years ago, a foundry convention was held in Chicago without an exhibition. Successful technical sessions were held then with an attendance of 1100, but this year, even with a limited exhibition, the attendance exceeded 3200 and both exhibits and technical sessions were crowded.

The marked success of the Chicago convention, from all points of view, gave the association officials renewed confidence in their organization and the industry it serves. Foundries and their products are being assiduously studied and the so-called new competition successfully combatted. Members of the organization are alive to their responsibilities and eager to forge ahead—and they are advancing.

Safe Range of Stress and Mean Stress in Fatigue Phenomena

That there is no general relation for metals between the safe range of stress and the mean stress of the cycle is the conclusion arrived at by Dr. Herbert J. Gough of the Engineering Department, National Physical Laboratory, Teddington, England. Some of the opinions of Dr. Gough, as published by the London *Iron and Coal Trades Review*, are given as follows:

Some metals conform to the Gerber parabolic relation, others follow closely the modified Goodman linear relation, and yet others conform to neither. In the absence of experimental data, a safe, though not accurate, range of alternating stress can usually be estimated if the range for reversed stresses and the ultimate tensile stress are known by using the modified Goodman relation (cases where this would predict a slightly unsafe range of stress have been recorded, but the error is usually of a small order).

It is dangerous, however, to attempt to estimate the safe range of fluctuating stresses in this way. It is perhaps hardly necessary to point out that, if the conditions of service of a machine or structural component do not permit permanent deformation of the metal, the maximum stress of the cycle should not exceed the elastic limit of the material; the usual allowances (factor of safety) should also, of course, be made to allow for unknown contingencies and possible lack of homogeneity of the material.

Standard Steel Specifications

An eleventh edition has been issued by the Carnegie Steel Co., Pittsburgh, of its book of Standard Specifications. These are covered in 129 pages and feature standards of the Association of American Steel Manufacturers, the American Society for Testing Materials, the American Society of Mechanical Engineers (boiler plates) and the Carnegie Steel Co.'s own standard specifications for wheels for freight cars and other purposes.

Following the arrangement in previous issues, this book gives instructions for testing and shows permissible variations in various characteristics for different types of steel used for differing purposes. It is illustrated by line cuts, and there is a considerable amount of tabular material.

Asks for Limited Tariff Revision

President Hoover's Message to Congress Also Urges a Strengthening of Powers of Tariff Commission

WASHINGTON, April 16.—Recommending legislation for farm relief, limited tariff revision, the decennial census, reapportionment of Congressional representation, and suspension of the national origins clause of the immigration act of 1924, the message of President Hoover, consisting of only about 2000 words, read to the special session of seventy-first Congress today, followed the general tenor that had been expected.

Reiterating the view expressed in his inaugural address, the President asked for only limited changes in the tariff. "We find," said he, "that there have been economic shifts necessitating a readjustment of some of the tariff schedules."

The implication was taken from this statement that certain schedules may be left entirely unchanged, but so far as the metal schedule is concerned it is thought there will be a few moderate changes in rates and classifications.

"Seven years of experience under the tariff bill enacted in 1922 have demonstrated the wisdom of Congress in the enactment of that measure," the President continued. "On the whole it has worked well. In the main our wages have been maintained at high levels; our exports and imports have steadily increased; with some exceptions our manufacturing industries have been prosperous. Nevertheless, economic changes have taken place during that time, which have placed certain domestic products at a disadvantage and new industries have come into being, all of which creates the necessity for some limited changes in the schedules and in the administrative clauses of the laws as written in 1922."

Basis Suggested for Tariff Changes

Fixing a basis upon which changes should be made, the President said:

"It would seem to me that the test of necessity for revision is in the main whether there has been a substantial slackening of activity in an industry during the past few years, and a consequent decrease of employment due to insurmountable competition in the products of that industry. It is not as if we were setting up a new basis of protective duties. We did that seven years ago. What we need to remedy now is whatever substantial loss of employment may have resulted from shifts since that time.

"No discrimination against any foreign industry is involved in equalizing the difference in costs of production at home and abroad and thus taking from foreign producers the advantages they derive from paying lower wages to labor. Indeed, such equalization is not only a measure of social justice at home, but by the lift it gives to our standards of living we increase the demand for those goods from abroad that we do not ourselves produce. In a large sense we have learned that the cheapening of the toiler decreases rather than promotes permanent prosperity because it reduces the consuming power of the people.

"In determining changes in our tariff we must not fail to take into account the broad interests of the country as a whole, and such interests include our trade relations with other countries. It is obviously unwise protection which sacrifices a greater amount of employment in exports to gain a less amount of employment from imports."

Recommends More Power for Tariff Commission

Turning to the need of important revision in some of the administrative phases of the tariff, the President recommended that the Tariff Commission should be reorganized and placed upon a basis of higher salaries "in order that we may at all times command men of the broadest attainments."

This view has gained considerable strength and it is likely that the Tariff Commission will thus be organized in some manner which will give it more power than it now possesses. This is in striking contrast to the opinion held some time ago that the commission might be weakened, if not actually disbanded. It is thought, however, that whatever turn the reorganization may take, the commission will continue to be of a bi-partisan rather than a non-partisan character.

The President also strongly upheld the principle of the flexible provision. He declared that it has proved practical and "in the long view a most important principle to maintain." He suggested, however, that "the basis upon which the Tariff Commission makes its recommendations to the President for administrative changes in the rates of duty should be made more automatic and more comprehensive, to the end that the time required for determinations by the Tariff Commission shall be greatly changed."

In urging changes in administrative features of the tariff law, the President emphasized the weakness in the valuations for assessments of duty. "There are cases of undervaluations that are difficult to discover without access to the books of foreign manufacturers, which they are reluctant to offer," declared the President. "This has become also a great source of friction abroad. There is an increasing shipment of goods on consignment, particularly by foreign shippers to concerns that they control in the United States, and this practice makes valuations difficult to determine. I believe it is desirable to furnish to the Treasury a sounder basis for valuation in these and other cases."

It is thought that the President has in mind recommendations made by Treasury Department officials to the House Committee on Ways and Means which would give appraising officers broader powers in determining values of imported goods.

Minnesota Furnace Put On to Relieve Steel Shortage

The blowing in of a second blast furnace of the Minnesota Steel Co. is occasioned by a shortage of semi-finished at Steel Corporation mills in the Chicago district, particularly the American Sheet & Tin Plate Co. The corporation canvassed its subsidiaries to relieve shortage and will push Minnesota subsidiary to practical capacity. Steel is already moving from Duluth to Gary.

Merger Formed of Airplane Accessory Companies

The Bendix Aviation Corporation has been formed to acquire the assets and business of the Bendix Corporation, Chicago, and its subsidiary, the Bendix Brake Co.; also the Eclipse Machine Co., with which the Bendix Corporation has had a close affiliation through licensing arrangements; the Delco Aviation Corporation, which was formed recently to take over the aircraft appliance business of the Delco-Remy Corporation, a subsidiary of the General Motors Corporation; also the Stromberg Carburetor Co. and the Scintilla Magneto Co. The General Motors Corporation will have a substantial interest in the new company. Vincent Bendix will head the new organization.

Davison Coke & Iron Co. to Add 35 Coke Ovens

The Davison Coke & Iron Co., Pittsburgh, will add a second battery of 35 coke ovens at its Neville Island, Pittsburgh, works. This will give the company a total of 70 ovens at this plant, with a total annual coal carbonizing capacity of 657,000 net tons and an expected metallurgical coke yield of 459,900 net tons. The purpose of the second battery of ovens is to supply coke for the company's other blast furnace at Sharpsville, Pa.

The Fleming Mfg. Co., New Castle, Pa., has changed its name to the Fleming Structural Steel Co., so that it may be identified more closely with the line of business it has been engaged in for many years.

Iron and Steel Markets

Mills Short of Semi-Finished Steel

Scarcity Reflected in Price Advance—Southern Pig Iron Declines as Valley and Eastern Pennsylvania Furnaces Raise Quotations—Scrap Weaker, Coke Lower

INCOMING business in finished steel is no longer equal to shipments except in the Chicago district. A letup in bookings was not unexpected in view of the unusually heavy commitments of producers and may indicate nothing more than an interlude between buying movements.

The present concern of the steel industry is not to add to its obligations, but rather to produce and ship the tonnage being specified. While the flow of finished steel to consumers is now apparently adequate to satisfy their needs, as evidenced by an abatement in the pressure for shipments, both integrated and non-integrated producers are handicapped by a scarcity of semi-finished material.

To relieve a shortage of steel at its Chicago district plants the Steel Corporation has put in a second blast furnace at Duluth and plans to raise mill output there to capacity. Crude steel is already moving from the head of the Lakes to Gary.

The tendency toward higher prices for semi-finished material has crystallized in a definite announcement by the leading steel interest of an advance, effective at once. Billets are raised $2 and sheet bars $1 a ton to a common quotation of $36.

Mills that sell crude steel are having difficulty apportioning the supply among their customers. Reserve stocks have already been virtually exhausted, and the replacing of this surplus will be an important factor in sustaining the high rate of ingot output when shipments of finished material begin to taper.

A seasonal recession in steel business usually begins about this time of the year, but no decline in the movement of finished products is yet evident. Such a change, which is expected to show itself first in automobile steels, may not occur for another 30 days.

While a dip in steel plant operations is looked for as summer approaches, it is believed that it will be even more gradual than in 1928. This view is apparently supported by the statement of President Farrell to stockholders of the Steel Corporation, forecasting sales of $1,500,000,000 for the year, compared with $1,374,400 000 in the previous 12 months.

If a reduction in the requirements of the motor car industry is due, demands from other consuming lines show few signs of diminishing. A large part of the steel for railroad equipment and fabricated steel orders recently placed is still to be rolled. Structural steel awards for the past seven days, although not matching the high totals of the two previous weeks, were above average, aggregating 58,000 tons. Makers of steel pipe for gas and oil lines have heavy backlogs, and a decline in production by makers of tillage machinery is more than offset by increased operations by manufacturers of other types of farm machinery. Road machinery builders are operating at capacity, and the expanded needs of can makers have forced the leading producer of tin plate to raise operations to 93 per cent, compared with 90 per cent of capacity a week ago.

A new source of tonnage will be the Government's cruiser program. On June 5 the Navy Department will receive bids on two light cruisers from private shipyards and estimates on three from Navy yards, calling for a total of 30,000 tons of plates and shapes.

Notable among the few iron and steel consuming industries that are retrenching are the makers of radiators and sanitary ware, who are commencing to feel the slump in dwelling house construction. Of interest also from a barometric standpoint is a slowing up in machine tool orders, after 10 consecutive monthly gains, extending through February.

Steel ingot output remains unchanged, with Steel Corporation subsidiaries operating at 96 per cent of capacity and independent plants at perhaps an even higher rate. Chicago district mills have been running above practical capacity and the strain on equipment is beginning to show, foreshadowing a curtailment of output for necessary repairs.

Mills are more concerned with operations than with prices, but second quarter quotations seem to be fully representative of the market except on black and galvanized sheets.

The situation in primary materials is mixed. Pig iron demand has paused between quarterly buying movements. Valley and eastern Pennsylvania furnaces have announced advances of 50c. a ton, but Southern pig iron has broken another 50c. a ton to $15, Birmingham, and sharper competition has developed in the Chicago district, where Buffalo iron, to be shipped by boat, is being offered at concessions.

Scrap is easier in most markets. While heavy melting steel is unchanged at Pittsburgh, virtually all other grades have declined in that center.

Furnace coke at Connellsville has receded another 5c. a ton to $2.75, entirely wiping out the advance that began in February and reached its peak early in March.

A Milwaukee fabricator of steel pipe and automobile frames has inaugurated Lake shipments of steel from Chicago, having received the initial cargo of 3000 tons last week. This company's April production schedule calls for 75,000 tons of plates and 25,000 tons of strip steel.

Copper has again declined, now being quoted at 18c., delivered Connecticut Valley.

A decline in THE IRON AGE composite price for pig iron, from $18.54 to $18.46 a ton, wipes out the advance of a week ago. Finished steel remains at 2.412c. a lb.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

	Apr. 16, 1929	Apr. 9, 1929	Mar. 19, 1929	Apr. 17, 1928
Pig Iron, Per Gross Ton:				
No. 2 foundry, Philadelphia	$21.76	$21.76	$21.26	$20.76
No. 2, Valley furnace	18.00	18.00	18.00	17.25
No. 2 Southern, Cin'ti	*18.69*	19.19	19.19	19.69
No. 2, Birmingham	15.50	15.50	15.50	16.00
No. 2 foundry, Chicago*	20.00	20.00	20.00	18.50
Basic, del'd eastern Pa.	20.25	20.25	20.25	19.50
Basic, Valley furnace	18.00	18.00	17.50	17.00
Valley Bessemer, del'd P'gh.	20.26	20.26	20.26	19.26
Malleable, Chicago*	20.00	20.00	20.00	18.50
Malleable, Valley	18.50	18.50	18.50	17.25
Gray forge, Pittsburgh	19.26	19.26	19.26	18.51
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	105.00	105.00	105.00	100.00
Rails, Billets, Etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	33.00
Sheet bars, Pittsburgh	35.00	35.00	35.00	34.00
Slabs, Pittsburgh	34.00	34.00	34.00	33.00
Forging billets, Pittsburgh	39.00	39.00	39.00	38.00
Wire rods, Pittsburgh	42.00	42.00	42.00	44.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.85	1.85	1.85	1.85
Finished Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.95	1.95	1.90	1.85
Bars, Chicago	2.05	2.05	2.05	2.00
Bars, Cleveland	1.95	1.95	1.95	2.04
Bars, New York	2.29	2.29	2.24	2.19
Tank plates, Pittsburgh	1.95	1.95	1.90	1.85
Tank plates, Chicago	2.05	2.05	2.05	2.00
Tank plates, New York	2.22½	2.22½	2.17½	2.17½
Structural shapes, Pittsburgh	1.95	1.95	1.90	1.85
Structural shapes, Chicago	2.05	2.05	2.05	2.00
Structural shapes, New York	2.19½	2.19½	2.14½	2.14½
Cold-finished bars, Pittsburgh	2.30	2.30	2.20	2.20
Hot-rolled strips, Pittsburgh	1.90	1.90	1.80	2.10
Cold-rolled strips, Pittsburgh	2.75	2.75	2.75	3.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

	Apr. 16, 1929	Apr. 9, 1929	Mar. 19, 1929	Apr. 17, 1928
Finished Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	2.85	2.85	2.85	2.80
Sheets, black, No. 24, Chicago dist. mill	3.05	3.05	3.05	3.00
Sheets, galv., No. 24, P'gh	3.60	3.60	3.60	3.65
Sheets, galv., No. 24, Chicago dist. mill	3.80	3.80	3.80	3.85
Sheets, blue, 9 and 10, P'gh	2.10	2.10	2.10	2.10
Sheets, blue, 9 and 10, Chicago dist. mill	2.30	2.30	2.30	2.20
Wire nails, Pittsburgh	2.65	2.65	2.65	2.65
Wire nails, Chicago dist. mill	2.70	2.70	2.70	2.70
Plain wire, Pittsburgh	2.50	2.50	2.50	2.50
Plain wire, Chicago dist. mill	2.55	2.55	2.55	2.55
Barbed wire, galv., P'gh	3.30	3.30	3.30	3.35
Barbed wire, galv., Chicago dist. mill	3.35	3.35	3.35	3.40
Tin plate, 100 lb. box, P'gh	$5.35	$5.35	$5.35	$5.25
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	$18.75	$18.75	$18.50	$15.50
Heavy melting steel, Phila	17.00	17.00	16.00	13.50
Heavy melting steel, Ch'go	16.00	16.00	15.50	12.50
Carwheels, Chicago	14.50	14.50	14.50	13.50
Carwheels, Philadelphia	16.50	16.50	16.50	15.50
No. 1 cast, Pittsburgh	15.50	15.50	15.25	14.50
No. 1 cast, Philadelphia	16.50	16.50	16.00	16.00
No. 1 cast, Ch'go (net ton)	16.00	16.00	16.00	14.00
No. 1 RR. wrot., Phila	16.00	16.00	16.00	15.00
No. 1 RR., Ch'go (net)	14.00	14.00	14.00	11.50
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	*$2.75*	$2.80	$3.00	$2.60
Foundry coke, prompt	3.75	3.75	3.75	3.75
Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	*18.12½*	22.00	22.12½	14.25
Electrolytic copper, refinery	*17.75*	21.75	21.75	14.12½
Tin (Straits), New York	*45.62½*	46.62½	49.50	52.75
Zinc, East St. Louis	*6.65*	6.80	6.35	5.75
Zinc, New York	*7.00*	7.15	6.70	6.10
Lead, St. Louis	*6.85*	7.10	7.37½	6.00
Lead, New York	*7.00*	7.25	7.50	6.10
Antimony (Asiatic), N. Y.	*9.75*	9.50	9.75	10.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Steel Mills Assured of High Operations for at Least 60 Days, Though New Business is Light

PITTSBURGH, April 16.—Despite the fact that incoming business this month is not equal to shipments except in a few scattered instances, it now seems assured that steel mills will be able to maintain a high rate of operations for at least 60 days and probably for the remainder of the second quarter. Operations have been maintained during the past week at about the rate which has prevailed for some time, with slight increases in some departments, notably tin plate. Pressure for shipments to the automotive industry has abated somewhat, as consumers now feel assured of an adequate supply of steel, but the aggregate movement of material into this channel is fully as large as it has been. Other consuming lines, especially railroad car builders, agricultural implement makers and the railroads, are also requiring steel in a large way and the prosperity of the industry is well distributed throughout all lines except oil country pipe and, to a lesser extent, wire. The operation of finishing mills at practical capacity rates has taxed to the utmost the open-hearth furnaces in this and nearby districts.

The shortage of semi-finished material, notably sheet bars, is still being felt keenly by non-integrated producers, and mills having crude steel for shipment are having difficulty in apportioning the supply among their customers. Reserve supplies of this material have already been practically exhausted and the replacing of this surplus will be a prominent factor in holding up the high ingot producing rate when finished steel shipments begin to taper. Such a decline, which is expected to be felt first as automobile production begins to ease off, will not likely occur for about 30 days.

With mills busily occupied in getting out the maximum amount of steel, prices do not seem to be receiving the usual emphasis. Quotations for second quarter named some time ago seem to be fully representative of the market in all cases except in sheets. Sales of black and galvanized sheets are still being made at 2.85c. and 3.60c., base Pittsburgh, respectively, although makers representing a considerable majority of the capacity in the Pittsburgh and Youngstown districts are holding to quotations $2 a ton above these prices. Bars are well established at 1.95c., Pittsburgh, and although there is occasional shading of this price on plates and shapes, it is considered representative of the usual market.

In basic materials rather conflicting trends appear. The scrap market, except in No. 1 railroad heavy melting steel, has developed a weaker tone. Furnace coke has eased off another 5c. a ton and is now quotable at $2.75 to $2.85, Connellsville. In the face of a rather quiet demand, Valley pig iron makers have announced an advance of 50c. a ton on all grades, this increase coming in less than a month after a similar advance, which had scarcely become well established, at least on the basic grade.

Pig Iron.—Several of the merchant producers have announced an advance of 50c. a ton on all grades of pig iron, and now are quoting basic and No. 2 foundry iron at $18.50 and Bessemer and malleable at $19, f.o.b. Valley furnaces. It is probable that other producers which have not as yet changed their quotations will follow. Shipments of iron on old contracts are still heavy, although reports from the radiator and sanitary ware manufacturers suggest far from a capacity demand for their products and a melt of iron by such companies that is well below the average for this time of year. Steel foundries serving the railroad equipment industry are doing better than in several years and steel makers which buy their iron are heavily engaged and taking iron freely. The higher asking prices for pig iron occasion some surprise among consumers, who are not entirely convinced that upon the basis of supply and demand there is much reason for the advance. Ore is costing more this year than last and this increase in costs is felt more promptly than usual because producers had put such a big dent in their reserves during the winter. But the cost of coke is not enough above the first quarter basis to add appreciably to producing costs. Large users of basic iron still regard the market as $19, delivered Pittsburgh, which would mean $17.25 at Valley furnaces and $17.85 at local steel works furnaces. The most recent sizable sale of this grade was at close to $19, delivered. Prices of other grades have not been entirely free from irregularity.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$18.00 to $18.50
Bessemer	18.50 to 19.00
Gray forge	17.50 to 18.00
No. 2 foundry	18.00 to 18.50
No. 3 foundry	17.50 to 18.00
Malleable	18.50 to 19.00
Low phos., copper free	26.50 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Semi-Finished Steel.—The shortage of billets, slabs and sheet bars still is marked, and a few non-integrated manufacturers are getting as much steel as they want. Indeed, some of the self-contained manufacturers, having pretty well exhausted reserve supplies, now are obliged to juggle current production so that finishing mills may have supplies sufficient to obviate the necessity of curtailing operations. Although the finished products that can be made from Bessemer steel are not moving nearly as well as those from open-hearth steel, the supply of Bessemer billets and sheet bars is not particularly large. Sheet bars are priced at $35, Pittsburgh or Youngstown, but it is said that none are available for early shipments, and this price rules chiefly in the case of shipments on regular contracts. Large billets and slabs at $34, Pittsburgh or Youngstown, are in much the same position. Wire rods are firm at $42, base Pittsburgh or Cleveland, and are moving well. The market is rather slow on pipe skelp, and prices are no more than steady.

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.80c.
Galv. sheets (No. 24), 25 or more bundles	4.55c.
Blue ann'l'd sheets (No. 10), 1 to 10 sheets	3.45c.
Galv. corrug. sheets (No. 28), per square	$4.43
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count,	60 per cent off list
Machine bolts, 100 count,	60 per cent off list
Carriage bolts, 100 count,	60 per cent off list
Nuts, all styles, 100 count,	60 per cent off list
Large rivets, base per 100 lb.	$3.50
Wire, black soft ann'l'd, base per 100 lb	$3.00 to 3.10
Wire, galv. soft, base per 100 lb.	3.00 to 3.10
Common wire nails, per keg	3.00
Cement coated nails, per keg	3.05

Bars, Plates and Shapes.—Makers of bars are busy on specifications placed during March. Delivery promises on new business still run from two to four weeks, despite the fact that accessions to order books are much smaller this month than in the same period last month. Plate business has been helped by releases for railroad car orders which lately have come to local shops. A fair tonnage also is embraced in recent river barge orders. Buyers, however, experience little trouble in securing a place on mill books for orders calling for early shipment. Structural steel business is improving, and, while the fabricators cannot look very far ahead, they have enough business to keep reasonably well engaged. Mills are commonly quoting 1.95c., base Pittsburgh, on these products; on moderate-sized lots for delivery into territory where the freight advantage is with the local mills, that price has been done. On the worth-while tonnages and on the requirements of the large tonnage buyers, the market still remains largely untested.

Wire Products.—Manufacturers get more satisfaction from a steady price situation than from the volume of current business. Nails have not yet picked up much in activity, and, although there is a fairly active movement of other products, total wire products business is somewhat behind its gait of the closing month of last year and the first month of this year.

Tubular Goods.—Welded pipe in the sizes required for building and construction work is doing well, but oil country requirements are moderate. There is much talk about the gas line to run from Monroe, La., to Birmingham and Atlanta, but the best opinion is that it will be some time before the details prior to the letting of the pipe are worked out. Municipal franchises and a right of way for the line must be secured, and then there is the important detail of financing, which hinges on whether there will be sufficient gas in the Monroe field for all the demands that are likely to be made upon it. Mechanical tubing shipments reflect no letdown in the activity of motor car industry; a good movement of boiler tubes also is reported.

Sheets.—Sheet mills, more than any other department of the industry, are feeling the shortage of semi-finished steel, and extreme cases have been reported during the last week when this shortage has brought about a slight curtailment in output. Otherwise operations in this and nearby dis-

The Iron Age Composite Prices

Finished Steel

April 16, 1929, 2.412c. a Lb.

One week ago	2.412c.
One month ago	2.391c.
One year ago	2.362c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, nails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High		Low	
1929	2.412c.,	Apr. 2;	2.391c.,	Jan. 8
1928	2.391c.,	Dec. 11;	2.314c.,	Jan. 3
1927	2.453c.,	Jan. 4;	2.293c.,	Oct. 25
1926	2.453c.,	Jan. 5;	2.403c.,	May 18
1925	2.560c.,	Jan. 6;	2.396c.,	Aug. 18

Pig Iron

April 16, 1929, $18.46 a Gross Ton

One week ago	$18.54
One month ago	18.29
One year ago	17.67
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1929	$18.54,	Apr. 9;	$18.29,	Mar. 19
1928	18.59,	Nov. 27;	17.04,	July 24
1927	19.71,	Jan. 4;	17.54,	Nov. 1
1926	21.54,	Jan. 5;	19.46,	July 13
1925	22.50,	Jan. 13;	18.96,	July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c. to 2.15c.
Del'd Philadelphia	2.27c.
Del'd New York	2.29c.
Del'd Cleveland	1.95c. to 2.00c.
F.o.b. Cleveland	1.95c. to 2.00c.
F.o.b. Lackawanna	2.05c.
F.o.b. Birmingham	2.15c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.	2.00c.
F.o.b. Pittsburgh mills, cut lengths	2.25c.
F.o.b. Birmingham, mill lengths	2.15c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.85c.
F.o.b. Chicago Heights mill	1.95c.

Iron

Common iron, f.o.b. Chicago	2.05c. to 2.10c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c.
F.o.b. Birmingham	2.15c.
Del'd Cleveland	2.14c.
Del'd Philadelphia	2.15c.
F.o.b. Coatesville	2.05c.
F.o.b. Sparrow Point	2.05c.
F.o.b. Lackawanna	2.05c.
Del'd New York	2.22½c.
C.i.f. Pacific ports	2.20c. to 2.30c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c. to 2.15c.
F.o.b. Birmingham	2.15c.
F.o.b. Lackawanna	2.05c.
F.o.b. Bethlehem	2.05c.
Del'd Cleveland	2.14c.
Del'd Philadelphia	2.01c. to 2.06c.
Del'd New York	2.14½c.
C.i.f. Pacific ports	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	2.00c.
Wider than 6 in., P'gh	1.90c.
6 in. and narrower, Chicago	2.20c.
Wider than 6 in., Chicago	2.10c.
Cooperage stock, P'gh	2.20c.
Cooperage stock, Chicago	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.30c.
Bars, f.o.b. Chicago	2.30c.
Bars, Cleveland	2.35c.
Shafting, ground, f.o.b. mill	*2.65c. to 3.60c.
Strips, P'gh	2.75c. to 2.85c.
Strips, Cleveland	2.75c. to 2.85c.
Strips, del'd Chicago	3.05c. to 3.15c.
Strips, Worcester	2.90c. to 3.00c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	4.25c. to 4.35c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland, to jobbers and retailers.)

	Base per Keg
Wire nails	$2.65 to $2.75
Galvanized nails	4.65 to 4.75
Galvanized staples	3.35 to 3.45
Polished staples	3.10 to 3.20
Cement coated nails	2.65 to 2.75

	Base per 100 Lb.
Bright plain wire, No. 6 to No. 9 gage	$2.50 to $2.60
Annealed fence wire	2.65 to 2.75
Spring wire	3.50 to 3.60
Galv'd wire, No. 9	3.10 to 3.20
Barbed wire, galv'd	3.30 to 3.40
Barbed wire, painted	3.05 to 3.15
Woven wire fence (per net ton to retailers)	65.00

Chicago district mill and delivered Chicago prices are $1 per ton above the foregoing. Birmingham mill prices $3 a ton higher; Worcester, Mass., (wire) mill $3 a ton higher on production of that plant; Duluth, Minn., mill $2 a ton higher; Anderson, Ind., $1 higher.

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or Northumberland, Pa.	$2.70
Less carloads, Wheeling or Reading	2.80

Sheets

Blue Annealed

	Base per Lb.
Nos. 9 and 10, f.o.b. P'gh	2.10c. to 2.20c.
Nos. 9 and 10, f.o.b. Chicago dist.	2.30c.
Nos. 9 and 10, del'd Cleveland	2.29c. to 2.39c.
Nos. 9 and 10, del'd Philadelphia	2.42c. to 2.52c.
Nos. 9 and 10, f.o.b. Birmingham	2.25c. to 2.35c.
Nos. 9 and 10, c.i.f. Pacific Coast ports	2.725c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.85c. to 2.95c.
No. 24, f.o.b. Chicago dist. mill	3.05c.
No. 24, del'd Cleveland	3.04c. to 3.14c.
No. 24, del'd Philadelphia	3.17c. to 3.27c.
No. 24, f.o.b. Birmingham	3.00c. to 3.10c.
No. 24, c.i.f. Pacific Coast ports	3.50c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh, No. 1 grade	4.00c. to 4.10c.
No. 24, f.o.b. P'gh, No. 2 grade	3.80c. to 3.90c.

Galvanized

No. 24, f.o.b. Pittsburgh	3.60c. to 3.70c.
No. 24, f.o.b. Chicago dist. mill	3.80c.
No. 24, del'd Cleveland	3.79c. to 3.89c.
No. 24, del'd Philadelphia	3.92c. to 4.02c.
No. 24, f.o.b. Birmingham	3.75c. to 3.85c.
No. 24, c.i.f. Pacific Coast ports	4.25c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	3.00c.
No. 28, f.o.b. Chicago dist. mill	3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	4.10c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill	4.00c.

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh	3.90c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	$5.35
Standard cokes, f.o.b. Gary	5.45

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$11.20
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.30
25-lb. coating I.C.	$16.70
30-lb. coating I.C.	17.75
40-lb. coating I.C.	19.85

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quality Bar Base, 2.65c. to 2.75c. per Lb.

Series Numbers		Alloy Differential
2000	(½% Nickel)	0.25
2100	(1½% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bars	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is ¾c. per lb. higher. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 down to and including 2½ in. squares, the price is $5 a gross ton above the 4 x 4 billet price.

Slabs with sectional area of 16 in. or over carry the billet price; slabs with sectional area of 12 in. to 16 in. carry a $5 extra above the billet price and slabs with a sectional area under 12 in. carry the bar price.

Band sizes are 40c. per 100 lb. higher.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	36.00
Light (from rail steel), f.o.b. mill	34.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝ in. and larger	$2.80
Spikes, ½ in. and smaller	2.80
Spikes, boat and barge	3.00
Tie plates, steel	2.15
Angle bars	$2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ and ⅜	+11	+36
¼ to ⅜	51	25½	½	23	5
½	56	42½	¾	28	11
¾	60	48½	1 and 1¼	31	15
1 to 3	62	50½	1½ and 2	35	18

Lap Weld

2	55	43½	2	23	9
2½ to 6	59	47½	2½ to 3½	28	13
7 and 8	56	43½	4 to 6	30	17
9 and 10	54	42½	7 and 8	29	16
11 and 12	53	40½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	41	24½	¼ and ⅜	+13	+48
¼ to ⅜	47	30½	½	23	7
½	53	42½	¾	28	12
¾	58	47⅛	1 to 2	34	18
1 to 1½	60	49½			
2 to 3	61	50½			

Lap Weld, extra strong, plain ends

2	53	42½	2	29	13
2½ to 4	57	46½	2½ to 4	34	20
4½ to 6	56	45½	4½ to 6	33	19
7 to 8	52	39½	7 and 8	31	17
9 and 10	45	32½	9 to 12	21	8
11 and 12	44	31½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	40	1½ in.	1
2½ in.—2¾ in.	48	1¾ in.	8
3 in.	54	2 in.—2¼ in.	13
3¼ in.—3¾ in.	56	2½ in.—2¾ in.	16
4 in.	59	3 in.	17
4½ in. to 6 in.	48	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	63	3 in.	48
1¼ to 1½ in.	55	3¼ to 3½ in.	50
1¾ in.	39	4 in.	53
2 to 2¼ in.	34	4½, 5 and 6 in.	42
2½ to 2¾ in.	42		

Hot Rolled

2 and 2¼ in.	40	3¼ to 3½ in.	56
2½ and 2¾ in.	48	4 in.	59
3 in.	54	4½, 5 and 6 in.	48

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base (carloads)	55
Carbon, 0.30% to 0.40%, base	50

Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

tricts are at practical capacity, and, barring the unforeseen, this rate will be maintained until the middle of the year. Deliveries range from three to six weeks, but most mills are unwilling to make commitments for the shorter period. New business is considered very satisfactory, and, although slightly under the March rate, it has enabled some mills to make small additions to their backlogs. The price situation, although improving, still leaves something to be desired. Mills representing fully 75 per cent of the country's capacity are holding at 2.95c., 3.70c. and 2.20c., Pittsburgh, for black, galvanized and blue annealed sheets respectively. Shading occurs principally in the galvanized product, but weakness is occasionally encountered in black sheets.

Tin Plate.—Tin mill operations have risen slightly in the last week, and the leading producer is now running at about 93 per cent of capacity, compared with about 90 per cent in the preceding week. With the independents operating at a slightly higher rate, the average is at least 96 per cent. In nearly every case, specifications from the can makers are exceeding expectations. Orders have been received this week for a considerable tonnage of tin mill black sheets for shipment to Japan. Since the completion of mills in Japan for rolling this product, American makers have not shared to any extent in this business.

Cold - Finished Steel Bars and Shafting.—New business continues to lag somewhat behind the volume of shipments. Shipments to the automotive industry are being maintained at about the same rate which has prevailed for several weeks. Other industries, such as the agricultural implement, are drawing heavily upon production. Prices are holding at 2.30c., Pittsburgh.

Hot-Rolled Strip.—Consumers seem to be more disposed to place second quarter contracts than they were earlier in the month, and new business booked in the week was considered satisfactory by most makers. Shipments are still running considerably ahead of specifications, but the present rate of operations is assured for at least a month, with makers of bands and rim stock committed well into June in some cases. New business is being placed at 2c., Pittsburgh, for stock 6 in. and narrower, and at 1.90c. for the wider sizes.

Cold - Rolled Strip.—Specifications on second quarter contract business are being received in increasing quantities, and mill commitments are being extended well into June. This business is largely priced at 2.75c., base, with the new card of extras applying. Small orders often command 2.85c., base, although this price would not be asked from the larger buyers. Shipments thus far in the month are running considerably ahead of new business.

Old Material.—Strictly No. 1 railroad heavy melting steel has been sold at from $19.25 to slightly more than $19.50 in the past week. The market is very firm on this grade, open market supplies of which have grown very limited on account of direct consumer buying and the infrequency of offerings. On all other grades, the market has a distinctly easier tendency. Regular No. 1 heavy melting steel is moving as freely to consumers on contracts as any of them desire, and dealers are experiencing no trouble in covering their short orders. Indeed, for delivery to some points, dealers are lowering their bids. Compressed sheets have eased off 25c. a ton and have carried prices of bundled sheet scrap with them. The steel foundries evidently have supplied their needs, as there is no longer real strength in the steel foundry grades of scrap.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 railroad heavy melting steel	$19.25 to $19.50
No. 1 heavy melting steel	18.50 to 19.00
No. 2 heavy melting steel	16.50 to 17.00
Scrap rails	18.25 to 18.75
Compressed sheet steel	18.25 to 18.75
Bundled sheets, sides and ends	17.00 to 17.50
Cast iron carwheels	16.25 to 16.75
Sheet bar crops, ordinary	19.00 to 19.50
Heavy breakable cast	13.00 to 14.00
No. 2 railroad wrought	19.25 to 19.50
Hvy. steel axle turnings	16.50 to 17.50
Machine shop turnings	11.00 to 11.50
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	21.00 to 22.00
Railr. coil and leaf springs	21.00 to 22.00
Rolled steel wheels	21.00 to 22.00
Low phos. billet and bloom ends	23.00 to 24.00
Low phos., mill plates	22.00 to 22.50
Low phos., light grades	21.00 to 22.00
Low phos., sheet bar crops	22.50 to 23.00
Heavy steel axle turnings	16.50 to 17.50
Electric Furnace Grades:	
Low phos., punchings	21.00 to 21.50
Hvy. steel axle turnings	16.50 to 17.50
Blast Furnace Grades:	
Short shoveling steel turnings	12.00 to 13.00
Short mixed borings and turnings	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Rolling Mill Grades:	
Steel car axles	21.50 to 22.00
Cupola Grades:	
No. 1 cast	15.50 to 16.00
Rails 3 ft. and under	21.00 to 22.00

Coke and Coal.—Prices on spot furnace coke have softened further in the last week, and this grade is now quotable at $2.75 to $2.85 per net ton, Connellsville. In other words, coke has lost the entire advance it gained two or three months ago, and is now quoted at about the same levels which prevailed for more than a year before that rise. Curtailment of production continues, but demand is practically negligible. Demand for foundry coke, however, is well sustained at unchanged prices. Coal prices are weak, and, while the market is still quotable at about the same range, a large Valley steel maker is reported to have contracted for about 800,000 tons of ¾-in., thin vein, gas coal for the year beginning April 1 at $1.80 per ton, f.o.b. Pennsylvania mines.

Rails and Track Supplies.—Demand for track supplies and accessories is running considerably ahead of last year's, and new business is coming in at a satisfactory rate. An Eastern road, which ordinarily enters its contracts for rails and track supplies with the privilege of omitting specifications in April and May, and has exercised this right in the past two years, has this year specified fully for both months. Light section rails are finding little demand.

To Discuss Foreign Trade at Washington

In connection with the annual meeting of the Chamber of Commerce of the United States several foreign trade topics will be covered. At the general session, beginning 9.40 a. m., Wednesday, May 1, addresses are scheduled as follows: "Our Stake in the Pacific," by Chester H. Rowell, Berkeley, Cal.; "Business Problems Common to Canada and the United States," by Hon. C. H. Cahan, member of Parliament of the Dominion of Canada; "Making a Tariff," by Hon. Willis C. Hawley, chairman, Ways and Means Committee, House of Representatives.

A round table conference will follow, with no set speeches, but open for free discussion by all in attendance, on the subject of "Tariff Principles," including tariff and industrial and agricultural stability, the flexibility of our tariff, parcel post with Cuba, the need for foreign trade zones, and world wide movement to abolish export and import prohibitions and restrictions. Among those who are expected to take part in the discussion are H. L. Derby, chairman, Tariff Committee, National Association of Manufacturers, New York; G. R. Parker, former president, American Exporters' and Importers' Association, New York; Hon. Richard J. Welch, House of Representatives; O. K. Davis, secretary, National Foreign Trade Council, New York, and H. H. Rice, assistant to the president, General Motors Corporation, Detroit.

After months of experimentation, the Cold Metal Process Co. announces that the Steckel method of producing rolled steel has proved a mechanical and commercial success. The Steckel mill takes cold steel 1/10 in. in thickness and reduces it to 1-1200 in., by passing it through a series of small rolls. The mill is a small, compact unit, and the process eliminates costly power drives and man-power. The company is now operating several mills, producing shim steel largely. One mill for the manufacture of strip tin plate is in operation at the Warren plant of the Republic Iron & Steel Co. under a license arrangement.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4 in. and under 10 in., Pittsburgh	$34.00 to $36.00
Rerolling, 4 in. and under 10 in., Youngstown	34.00 to 36.00
Rerolling, 4 in. and under 10 in., Cleveland	35.00 to 37.00
Rerolling, 4 in. and under 10 in., Chicago	35.00 to 37.00
Forging quality, Pittsburgh	39.00 to 41.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$35.00 to $36.00
Youngstown	35.00 to 36.00
Cleveland	35.00 to 36.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$34.00
Youngstown	34.00
Cleveland	34.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$42.00
Cleveland	42.00
Chicago	43.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	10.00c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic Swedish, average 65% iron	9.00c.
Manganese ore, washed, 52% manganese, from the Caucasus	33.00c. to 35.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	33.00c. to 35.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	$14.75 to $15.50

	Per Gross Ton
Chrome ore, 45 to 50% Cr_2O_3, crude, c.i.f. Atlantic seaboard	$22.00 to $24.00

	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2, delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.75 to $2.85
Foundry, f.o.b. Connellsville prompt	3.75 to 4.85
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.25 to $1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in., f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$105.00
Foreign, 80%, Atlantic or Gulf port, duty paid	105.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$31.00 to $34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

Per Gross Ton Furnace		Per Gross Ton Furnace	
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$31.00	12%	$35.00
11%	33.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$24.00	10%	$29.00
7%	25.00	11%	31.00
8%	26.00	12%	33.00
9%	27.00		

Other Ferroalloys

Ferrotungsten, per lb., contained metal del'd	98c. to $1.05
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. del'vered, in carloads	11.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	$91.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton	$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines	$18.00
No. 2 lump, Illinois and Kentucky mines	20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	$18.00 to 19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	.....
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to an including ⅛ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagons nuts	70
Semi-finished hexagons castellated nuts, S.A.E.	70
Stove bolts in packages, Pittsburgh	80, 10 and 5
Stove bolts in packages, Chicago	75, 20, 10 and 5
Stove bolts in packages, Cleveland	75, 20, 10 and 5
Stove bolts in bulk, Pittsburgh	80, 10, 5 and 2½
Stove bolts in bulk, Chicago	75, 20, 10, 5 and 2½
Stove bolts in bulk, Cleveland	75, 20, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55 60 per cent apply.

Large Rivets

(½-In. and Larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.10
F.o.b. Chicago	3.20

Small Rivets

(7/16-In. and Smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10 and 5
Milled standard set screws, case hardened,	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S. thread	85
Upset hex. cap screws, S.A.E. thread	85
Upset set screws	80, 10 and 5
Milled studs	70

Chicago

No Abatement in Steel Demands—Mill Backlogs Larger Than a Month Ago—Deliveries Less Favorable

CHICAGO, April 16.—Consumers' interest in new purchases shows little abatement, as sales for the week total far above the average seven-day period in 1928 and are fully equal to the average week so far this year. Backlogs in recent weeks have shown a steady increase in size, and now are larger than at the end of the second week in March. Specifications far outdistance shipments, and deliveries are less favorable than at any time this month. Plates and mild steel bars cannot be had in less than 12 weeks, and in structurals, which are in active demand for car building, deliveries are extended to seven or eight weeks. Chicago district mills are still operating above what had been considered their practical capacity, but the strain on equipment is beginning to show and some producers foresee the time near at hand when necessary repairs will force curtailment of output.

About 7500 tons of steel will be needed for 500 cars ordered by the Northern Pacific and a like tonnage will be required for cars for which the Union Pacific is inquiring.

Local producers of semi-finished steel are out of the market and it is said that business in billets has been refused at $36 a ton. Prices for finished steel are firm.

Pig Iron.—The opening of navigation is at hand and water movement of pig iron from Lake Erie ports to lower Lake Michigan will soon be under way. One seller is said to have negotiated for about 20,000 tons for shipment from Buffalo. A Chicago producer has sent a cargo to Muskegon, Mich., and additional shipments are to follow. Selling prices of boat iron range from $19.50 to $20 a ton, Chicago, with silicon schedules disregarded, at least in part. Northern iron produced in local furnaces is firm at $20 a ton. A few additional third quarter contracts have been placed by large consumers and many users are daily in the market for spot tonnages. Pressure for deliveries is severe; hold-up orders are absent. Sellers of Southern iron find the market in and near Chicago very quiet. Offering prices range from $21.01 to $21.51 a ton, delivered all rail to Chicago.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	20.50
Malleable, not over 2.25 sil	20.00
High phosphorus	20.00
Lake Super. charcoal, sil. 1.50	27.04
So'th'n No. 2 fdy. (all rail)	$21.01 to 21.51
Low phos., sil. 1 to 2, copper free	29.50
Silvery, sil. 8 per cent	30.79
Bess. ferrosilicon, 14-15 per cent	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys. — Specifications continue heavy, as most users in this district are producing nearly at capacity. Ferromanganese is quoted at $105 a ton, seaboard. Several users of spiegeleisen are contemplating entering the market with orders that range upward to 100 tons each.

Prices delivered Chicago: 80 per cent ferromanganese, $112.56; 50 per cent ferrosilicon, $83.50 to $88.50; spiegeleisen, 19 to 21 per cent, $40.76.

Sheets.—Current specifications for sheets are in excess of practical capacity of local hot mills, but the acute shortage of semi-finished steel is holding output between 80 and 85 per cent of capacity. Deliveries now range from three to six weeks, depending on the finish. Mill emergency stocks are said to be depleted. Forward contracting, which has been unusually slow in getting under way, is now progressing and mill books are growing at a rapid rate. Slightly heavier specifications are being received from the roofing trade. Although this market is not without occasional irregularities, prices may be said to be steady at 2.35c., per lb., Chicago, for blue annealed sheets, 3.85c. for galvanized and 3.10c. for black.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 3.10c.; No. 24 galv., 3.85c.; No. 10 blue ann'l'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Rails and Track Supplies.—This market is featured by insistent demands for deliveries. New buying and inquiries for standard-section rails are quiet. New purchases of track supplies total close to 3000 tons. The light rail market is quiet except for occasional car lot orders.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, $43; light rails, rolled from billets, $36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.15c.; angle bars, 2.75c.

Wire and Wire Products.—Specifications from the manufacturing trade are steady. Jobbers in the Central West and in the South find business more active, but in the Northwest there is no improvement. The jobbing trade reports that sales are a trifle below expectations. The nail market is dull for this time of the year.

Cast Iron Pipe.—Awards for cast iron pipe are heavy, the total being close to 25,000 tons. Detroit placed the following orders: 1000 tons of 24-in. at $41 a ton, delivered, to American Cast Iron Pipe Co.; 1500 tons of 24-in. at $40.65 to James B. Clow & Sons; 2000 tons of 36-in. at $40.92 to Lynchburg Foundry Co.; 3800 tons of 36-in. and 1500 tons of 24-in. at $39.30 to a French maker; 4000 tons at $41.25 to the United States Cast Iron Pipe & Foundry Co. The freight rate from Birmingham to Detroit is $7.92 a ton. Akron, Ohio, divided 3900 tons, the small fittings and small pipe having been given to the American Cast Iron Pipe Co. and the larger sizes to the United States company. The National Cast Iron Pipe Co. has taken 26,000 ft. of 6-in., 1200 ft. of 8-in. and 7000 ft. of 4-in. through T. C. Brooks & Sons for Spencerville, Ohio. James B. Clow & Sons have taken orders for 100 tons from Wooster, Ohio, and 500 tons from Saginaw, Mich. The latter order was placed at $45.30 a ton, delivered, or $36.41, Birmingham. Glamorgan Pipe & Foundry Co. is low bidder at $45 a ton on 1000 tons of 12-in. Class B pipe for Chicago. The Grand Rapids, Mich., sewage project has been indefinitely postponed. Franklin County, Ohio, will receive bids April 19 on 86,000 ft. of 4 to 16-in. pipe.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $44.20 to $46.20; 4-in., $48.20 to $50.20; Class A and gas pipe, $3 extra.

Structural Material.—Chicago and the Central West continue to lag in building construction of most types. Total awards for the week are only slightly in excess of 2000 tons. Individual lettings are small. Fresh inquiry for office and apartment buildings is dragging, but an increased amount of industrial work is up for bids. Bridge builders are heartened by inquiries for 5000 tons from the Chicago & North Western and a smaller tonnage from the Rock Island. Railroad bridge work has been lacking in this market for many weeks. Sellers report larger shipments of structural material, but an analysis of shipping instructions shows that this is the result of increased use by car builders and is in no way a reflection of heavier building programs. Deliveries are retarded, and now are in the range of seven to eight weeks. The situation among fabricators in the immediate Chicago district is mixed. Some shops have very small order books, while others are comfortably fixed for the near future. Milwaukee fabricators are reasonably busy, but at Indianapolis the few contracts offered are eagerly sought after. As a general rule, shops to the west of Chicago are badly in need of work to hold organizations intact. Notwithstanding the scarcity of actual inquiries and awards, it is common to find architects busy and undiscouraged over the present situation.

Mill prices on plain material, per lb.: 2.05c. to 2.15c. base, Chicago.

Bars.—New purchases and specifications for mild steel bars are unusually heavy, as the general manufacturing trade holds to a high rate of consumption. Deliveries on most sizes are now not better than 12 weeks. Road machinery builders are operating at capacity, with order books that are heavy for this time of the year. Recession in activity among manufacturers of tillage machinery is more than offset by the increased demand for steel for other types of farm machinery, for which the seasonable de-

mand is now at hand. It is noteworthy that builders of farm equipment, especially tractors, are rapidly turning to greater use of special steels. Prices for mild steel bars are firm at 2c. to 2.10c. per lb., Chicago. Consumers of iron bars are issuing heavy specifications; mill backlogs are the largest in four years. Although some changes are taking place in automobile output, the total demand from all units in the industry appears to be little affected, as indicated by shipments of alloy steel bars from Chicago mills. Spot buying is more active at current quotations, which are firm. Deliveries still range from four to five weeks. Specifications for rail steel bars are much heavier, and new sales are approximately equal to shipments. Users as a general rule are insistent on prompt delivery, and there is little indication that stocks in consumers' hands have grown. Reports again are being circulated that an advance of $1 a ton is imminent.

Reinforcing Bars.—Keen competition for reinforcing bars made from old rails is leading to prices as low as 1.90c. a lb. Quotations on billet steel reinforcing bars are moderately steady at 2.35c. to 2.40c. a lb. out of Chicago warehouses. The general level of shop operations in this district is between 60 and 70 per cent of capacity. The bulk of tonnage shipped is against commitments made earlier in the year. Fresh inquiries bulk large, but, like many of those on the pending list, they move slowly, with the result that awards are small in the aggregate and of insufficient volume to support output at the present rate.

Old Material.—Sentiment is somewhat mixed as to the tendencies of the Chicago scrap market, though it is quite evident that in most quarters there is a feeling that the general situation is stronger and that prices for the heavy tonnage grades are due for an advance. It is reported that the Gary mills have placed orders for heavy melting steel at $16.50 a gross ton, delivered. In Chicago, transactions in this grade between producers and brokers are freely made at $17 a ton, delivered. The last sale to a consumer, other than the ones reported to have been made at Gary, was at $16.50 and sellers are striving for $17 on sales that are in the making. Cast iron borings show fair strength at $11 a ton. Less of this grade is coming into Chicago from outside producing centers, and it appears that local output closely matches consumption. There is an active demand for punchings for use as ballast. Improperly prepared agricultural scrap in charging box sizes is the cause of high rejections at mills. Demand for specialties is unusually brisk.

Prices deliv'd Chicago district consumers:

	Per Gross Ton
Basic Open-Hearth Grades:	
Heavy melting steel	$16.00 to $16.50
Shoveling steel	16.00 to 16.50
Frogs, switches and guards, cut apart, and misc. rails	17.50 to 18.00
Hydraul. compressed sheets	14.50 to 15.00
Drop forge flashings	12.00 to 13.00
Forg'd cast and r'l'd steel carwheels	19.00 to 19.50
Railroad tires, charg. box size	19.00 to 19.50
Railroad leaf spring cut apart	19.00 to 19.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles	17.50 to 18.00
Coil springs	20.00 to 20.50
Electric Furnace Grades:	
Axle turnings	16.50 to 17.00
Low phos. punchings	18.00 to 18.50
Low phos. plate, 12 in. and under	17.50 to 18.00
Blast Furnace Grades:	
Axle turnings	11.25 to 11.75
Cast iron borings	10.50 to 11.00
Short shoveling turnings	10.50 to 11.00
Machine shop turnings	7.50 to 8.00
Rolling Mill Grades:	
Iron rails	16.00 to 16.50
Rerolling rails	17.50 to 18.00
Cupola Grades:	
Steel rails less than 3 ft.	19.50 to 20.00
Steel rails less than 2 ft.	20.50 to 21.00
Angle bars, steel	17.50 to 18.00
Cast iron carwheels	14.50 to 15.00
Malleable Grades:	
Railroad	19.50 to 20.00
Agricultural	16.50 to 17.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00
	Per Net Ton
Rolling Mill Grades:	
Iron angles and splice bars	15.00 to 15.50
Iron arch bars and transoms	21.50 to 22.00
Iron car axles	27.50 to 28.00
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	14.25 to 14.75
No. 2 railroad wrought	14.25 to 14.75
No. 1 busheling	12.25 to 12.75
No. 2 busheling	7.00 to 7.50
Locomotive tires, smooth	14.50 to 15.00
Pipes and flues	10.00 to 10.50
Cupola Grades:	
No. 1 machinery cast	16.00 to 16.50
No. 1 railroad cast	15.50 to 16.00
No. 1 agricultural cast	14.50 to 15.00
Stove plate	12.75 to 13.25
Grate bars	13.50 to 14.00
Brake shoes	12.50 to 13.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Plates. — Notwithstanding recent heavy commitments, new sales are large. A Milwaukee consumer is now getting shipments by boat from Chicago mills, and it is probable that this service will be expanded if the cost of transporting by water proves more attractive than by rail. New orders from oil producing districts are scarce. Fresh inquiry, which is confined to a single lot of 4000 tons, is lighter than in many weeks. Chicago mills are producing at capacity, and still shipments fall short of current specifications, with the result that deliveries now are not better than 12 weeks. Prices are strong at 2c. to 2.10c. per lb., Chicago. Release orders issued by the car builders are heavier, but in the opinion of producers the peak of weekly shipments to these shops has not been reached. The Northern Pacific has ordered 500 automobile cars from the Pacific Car & Foundry Co. The Union Pacific will buy 500 cars. This is the largest inquiry since that of the Baltimore & Ohio for 3000 cars, mentioned a week ago.

Mill prices on plates, per lb.: 2.05c. to 2.15c. base, Chicago.

Bolts, Nuts and Rivets.—Buyers have been unusually prompt in signing and returning second quarter contracts. Specifications are being issued at a steady rate, which is a shade below the April rate last year. Demand for small rivets is heavy, but large rivet specifications are comparatively light because of dullness in the local building trades.

Coke.—Prices for by-product foundry coke are steady at $8 a ton, f.o.b. local ovens. A slight increase in the cost of coal is being absorbed by producers. Shipments for foundry use are unchanged from the record rate maintained in recent weeks.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinforc'g bars, billet steel	2.35c. to 2.40c.
Reinforc'g bars, rail steel	1.90c. to 2.05c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Bands (¼ in. in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)	3.75c.
Black sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.65c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes, stand. railroad	3.55c.
Track bolts	4.55c.
Rivets, structural	3.80c.
Rivets, boiler	3.80c.
	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws	60
Hot-pressed nuts, sq., tap. or blank	60
Hot-pressed nuts, hex., tap. or blank	60
No. 8 black ann'l'd wire, per 100 lb.	$3.30
Com. wire nails, base per keg	3.20
Cement c't'd nails, base per keg	3.20

Detroit Scrap Unchanged

DETROIT, April 16.—A sharp drop in the price of automobile cast scrap is explained by the fact that automobile foundries are using larger quantities of briquetted borings.

Automotive production continues on a high basis, with shipments of pig iron in the district on a par with those of last month. Some melters are inquiring for third quarter iron.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$14.50 to $15.00
Borings and short turnings	9.00 to 9.50
Long turnings	7.75 to 8.25
No. 1 machinery cast	14.50 to 15.00
Automobile cast	16.00 to 16.50
Hydraul. comp. sheets	14.00 to 14.50
Stove plate	9.50 to 10.00
No. 1 busheling	11.00 to 11.50
Sheet clippings	10.00 to 10.25
Flashings	12.50 to 13.00

St. Louis Steel Fabricators Hold Conference

What the American Institute of Steel Construction is doing and its plans for the future were explained to 50 structural steel fabricators of St. Louis and environs by Charles F. Abbott, executive director of the institute, at a luncheon meeting at Hotel Statler, St. Louis, April 11. In the afternoon, engineers and salesmen of these fabricators were brought into the conference, and in the evening there was a dinner, attended by architects, engineers, contractors and public officials. About 250 persons were present. John W. Thomsen, secretary, Stupp Brothers Bridge & Iron Co., was toastmaster.

Cleveland

Slight Easing in Demand for Steel, Though Total is Still Large—Ford Motor Co. Buys 1929 Ore Supply

CLEVELAND, April 16.—There appears to be a slight easing up in the demand for finished steel, as compared with March, although specifications of some of the mills show no falling off. With the heavy backlogs of orders, deliveries on steel bars, plates and shapes have become more extended. Mills are shipping sheets and hot and cold-rolled strip in about the same volume as incoming orders, so that deliveries on these products are not becoming more extended. That the peak in automobile production this season may have been passed is indicated by the slowing down of two or three motor car manufacturing plants. There is no evidence, however, that others are planning early retrenchment, and the two makers of low-priced cars with the largest production are expected to maintain their present output for an indefinite period. The demands from most other consuming industries are good. An increase is reported in the call for sheets from the stove and refrigerator manufacturers.

New inquiry in the structural field continues light. The outstanding award of the week was 4500 tons for the sheet mill plant of the Newton Steel Co. at Monroe, Mich. Lake shipyards have received an inquiry for a Lake boat requiring 2500 tons of steel, this being the first boat to be figured on this season. The Bethlehem Steel Co. has taken 500 tons of rails for the Cleveland Railway Co.

The market is firm at regular quotations. Steel bars are holding to 1.95c. to 2c., either delivered Cleveland or with Cleveland as a basing point, and plates and structural material are quoted at 1.95c., Pittsburgh. A large share of the week's business was in specifications against contracts taken at these prices.

Pig Iron.—The market was quieter the past week than for some time. Sales by Cleveland interests totaled 12,500 tons, which was less than half of the amount booked in the previous week. While some business for the third quarter was taken during the peak of the recent buying movement in March, no interest is being shown at present in contracts for that delivery either by the automotive industry or other consumers, and producers are making no effort to make sales for third quarter shipment. Orders during the past week were all for foundry and malleable iron in small lots. Some of these are coming from foundries that had not bought as much iron as they thought they would need and some from consumers that have taken on additional business, so that they will require more iron than they expected to melt during the quarter. Shipments are still being made in heavy volume. The market is firm, with prices unchanged. Local furnaces quote foundry and malleable iron at $18.50, furnace, for outside shipment and at $19 for Cleveland delivery. Iron for shipment to western Ohio and Indiana is held at $19 by one Lake furnace interest. In Michigan, $20.50 is the ruling Lake furnace price for foundry iron, and some effort is being made to get $21 for malleable.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	$19.50
S'th'n fdy., 1.75 to 2.25	$21.00 to 21.50
Malleable	19.50
Ohio silvery, 8 per cent	29.00
Basic Valley furnace	18.00
Stand. low phos., Valley	$26.50 to 27.00

Prices, except on basic and low phosphorus, are delivered Cleveland. Freight rates: 50c. from local furnaces; $3 from Jackson, Ohio; $6 from Birmingham.

Iron Ore.—The Ford Motor Co. has placed orders for its 1929 ore requirements, purchasing 309,000 tons, although its inquiry was for 354,000 tons. The company will also take 25,000 tons bought last year, shipment of which was deferred. The Ford company divided the business among four producers, one that had not previously participated in the Ford business getting 132,000 tons. Another seller took 100,000 tons, and the remaining 77,000 tons was divided between two Cleveland ore firms. As no information was given out regarding the prices, it is not known whether the Ford company was able to secure concessions from the regular prices on any of the business, although it is known that at least part of the tonnage was placed at the regular 1929 schedule. Most consumers have covered for their ore requirements for the year, and leading sellers have little ore left to offer for shipment this season except high phosphorus and silicon grades. The demand for high phosphorus ore has declined materially, because of changes in the demands of the industries using castings, particularly the automotive industry, the trend being toward iron having a lower phosphorus content than formerly. Shippers are expected to begin moving ore by water before the end of the month, and the early ore movement will probably be heavy.

Semi-Finished Steel.—While orders against second quarter contracts for sheet bars, billets and slabs are taxing the capacity of producers, deliveries are getting no worse. Several of the non-integrated mills are still short of steel, but are making little effort to secure supplies from outside sources, as producers are able to take care only of their regular customers.

Old Material.—A Cleveland steel plant has purchased several thousand tons of blast furnace scrap at $12 per ton, or 25c. a ton below its previous purchase price. The dealers' price on this grade has also declined 25c. a ton. Dealers are paying a maximum of $11.50 and are able to buy some lots at $11.25. Machine shop turnings are also about 25c. a ton lower. Heavy melting steel and grades other than blast furnace scrap and machine shop turnings are firm at recent prices. The supply of scrap is plentiful, but apparently not in excess of the demand. The first water shipments of the season, two small cargoes of heavy melting steel scrap totaling about 1500 tons, reached Cleveland during the week from Detroit.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades	
No. 1 heavy melting steel	$15.50 to $16.00
No. 2 heavy melting steel	15.00 to 15.50
Compressed sheet steel	15.00 to 15.50
Light bundled sheet stampings	12.00 to 12.50
Drop forge flashings	13.00 to 13.25
Machine shop turnings	9.50 to 10.00
No. 1 railroad wrought	13.25 to 13.50
No. 2 railroad wrought	16.00 to 16.50
No. 1 busheling	12.50 to 13.00
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades	
Low phos., forging crops	18.50 to 19.00
Low phos., billet, bloom and slab crops	18.50 to 19.00
Low phos. sheet bar crops	18.00 to 18.50
Low phos. plate scrap	18.00 to 18.50
Blast Furnace Grades	
Cast iron borings	11.25 to 11.50
Mixed borings and short turnings	11.25 to 11.50
No. 2 busheling	11.25 to 11.50
Cupola Grades	
No. 1 cast	16.75 to 17.25
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft.	16.75 to 17.25
Miscellaneous	
Railroad malleable	16.00 to 16.50
Rails for rolling	16.25 to 16.50

Sheets.—Mills, as a rule, are not getting further behind on deliveries, indicating that the volume of orders is not quite as heavy as recently. While a few consumers have accumulated stocks, large buyers in the automotive field are using up the steel as fast as received. Large orders are coming from the barrel manufacturers. Common black sheets are less active than other grades, and it is stated that the price shading to 2.85c., Pittsburgh, which is still in evidence on black sheets, has been mostly on the common grades. Blue annealed sheets are still being shaded to 2.10c. to meet the competition of continuous mills, and on galvanized sheets 3.60c. is still appearing. Most mills are fully committed for six to eight

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to ¼ in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.70c.
Galvanized sheets (No. 24)	4.25c. to 4.55c.
Blue ann'l'd sheets (No. 10)	3.25c.
No. 9 ann'l'd wire, per 100 lb.	$2.95
No. 9 gal. wire, per 100 lb.	3.40
Com. wire nails, base per keg	2.95

*Net base, including boxing and cutting to length.

weeks, although deliveries on galvanized sheets are being promised in as early as three weeks.

Wire Products.—Nails are moving better than for some time and prices appear firmer than they have been, although irregularities are still reported in some sections. The demand for manufacturers' wire is heavy.

Strip Steel.—The demand for hot-rolled strip against second quarter contracts continues heavy, although there is less pressure for delivery from some consumers. Mill shipments range from four to eight weeks. Prices are firm at regular quotations. Orders for cold-rolled strip equal production and most mills are fully committed for four weeks or longer. The market is firm at 2.75c., Cleveland, with the new extras applying. Small lots are bringing 2.85c.

Warehouse Business. — Orders are plentiful, and some jobbers report a slight gain over March. Irregularities exist on galvanized sheets, as some distributers have not joined in the recent price advance.

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues good, the volume holding up to that of the previous few weeks. Orders are heavy from the automotive industry and good from other consumers and from jobbers. The industry is operating at 70 to 75 per cent of capacity. Rivet specifications have declined, following the heavy influx of orders last month on old lower-priced contracts. However, makers are getting quite a few specifications against contracts taken at the new price of $3.10 per 100 lb., Cleveland and Pittsburgh.

Coke.—Foundry coke continues in good demand, with no changes in prices. Ohio by-product foundry coke is quoted at $8.25, Painesville.

New York

Pig Iron Buyers Delay Action Pending Price Developments —Steel Prices Are Firmer

NEW YORK, April 16.—Pig iron buyers are not yet showing much interest in their third quarter requirements and those who still have tonnage to buy for the current quarter are postponing action, in many cases, pending price developments. Producers appear to be taking a stronger stand for the advanced prices that they recently announced, but individual tonnages placed during the week have not been large enough to give the market a real test. The inquiry of the New York Air Brake Co. for 2000 tons for its Watertown, N. Y., plant is still pending. Small lots placed during the week have brought $18.50 to $19, base Buffalo, for foundry iron. Total sales in this district probably did not exceed 7000 tons. Importers are doing somewhat better business in foreign iron, notably Dutch 1X, which is quoted at $22.25, duty paid port of entry. With the opening of the State barge canal close at hand, arrangements are being completed for water shipments from Buffalo. In addition to two producers who have contracted for barge space, a third is negotiating for accommodations. Rates are now reported to be $2 a ton to Beacon, N. Y., and $2.15 for delivery alongside in the lighterage limits of New York harbor.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$22.41 to $23.91
*Buf. No. 2, del'd east. N. J.	20.78 to 22.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	20.89 to 22.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	21.39 to 22.52
East. Pa. No. 1X fdy., sil. 2.75 to 3.25	21.89 to 23.02

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.
*Price delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

Ferroalloys.—New business in ferromanganese and spiegeleisen is confined to a few carloads for early delivery at unchanged prices. Shipments on contracts are exceedingly heavy for these and other ferroalloys.

Reinforcing Bars. — Lettings are rather light, but sizable jobs are pending and a fair volume of new work is coming into the market. More road work is being undertaken with the approach of milder weather, and public school construction will take considerable tonnage in the aggregate. Various school buildings in New York will take about 75 tons each, while a number of suburban schools in New Jersey will require 50 to 60 tons each.

Billet steel reinforcing bars in 40, 50 and 60-ft. lengths, 2.05c. per lb., Pittsburgh, and 2.30c. per lb., Pittsburgh warehouse, for cut lengths. Out of New York warehouse, 2.90c. per lb. for lots of 5 tons or more, 3.05c. for lots of 2 to 5 tons and 3.30c. for less than 2 tons, all delivered at job.

Warehouse Business. — Shipments from warehouse stocks are increasing in number and size, so that April is expected to show the largest month's business so far this year. Orders for structural material are increasing in size, and there is an increase in demand for galvanized sheets. Sheet prices are still subject to some shading.

Finished Steel.—A steady flow of specifications against contracts is reported by local sales offices of steel companies, but new business is not conspicuous, largely because of the very generous coverage enjoyed by consumers. Prices for plates, shapes and bars have become firmer, in view of the fact that some specifications are being received against second quarter contracts carrying the $1 advance over first quarter prices. Eastern plate mills are in a comfortable position as to orders on their books, and are quoting deliveries of two to four weeks, but usually the minimum is three weeks. The structural department of the Bethlehem Steel Co. is operating at a record rate. The sec-

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, small shapes	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Cold-roll. strip, soft and quarter hard	5.15c. to 5.40c.
Hoops	4.25c.
Bands	3.75c.
Blue ann'l'd sheets (No. 10)	3.85c. to 3.90c.
Long terne sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, 1½ x ½ in. and larger	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.
Open-hearth spring steel, bases,	4.50c. to 7.00c.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	60
1 x 30 in. and smaller	50 to 50 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	60
¾ x 20 in. and smaller	50 to 50 and 10
Coach screws:	
½ x 6 in. and smaller	60
1 x 16 in. and smaller	50 to 50 and 10

Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.	$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
½-in. butt	46	29
¾-in. butt	51	37
1-3-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
½-in. butt	5	+19
¾-in. butt	11	+ 9
1-1½-in. butt	14	+ 6
2-in. lap	5	+14
3-6-in. lap	11	+ 6
7-12-in. lap	3	+16

Tin Plate (14 *x* 20 *in.*)

	Prime	Seconds
Coke, 100 lb. base box	$6.45	$6.20
Charcoal, per Box—	A	AAA
IC	$9.70	$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 *x* 20 *in.*)

IC—20-lb. coating	$10.00 to $11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	3.80c.
No. 22	3.95c.
No. 24	4.00c.
No. 26	4.10c.
No. 28*	4.25c.
No. 30	4.50c.

Sheets, Galvanized

	Per Lb.
No. 14	4.40c.
No. 16	4.25c.
No. 18	4.40c.
No. 20	4.50c.
No. 22	4.60c.
No. 24	4.75c.
No. 26	5.00c.
No. 28*	5.25c.
No. 30	5.65c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ond quarter prices have not become firmly established on black and galvanized sheets, but blue annealed is quite firm at 2.20c., Pittsburgh, and the higher prices probably would be quoted by nearly all mills on full finished sheets, but consumers of such are nearly all protected by current shipments at the former prices. Hot-rolled and cold-rolled strip steel appear to be very firm.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.29c.; plates, 2.22½c.; structural shapes, 2.19½c.; bar iron, 2.14c.

Cast Iron Pipe.—Most Northern foundries are only moderately well filled with business, but prices are fairly well maintained. Albany, N. Y., will take new bids until April 24 on about 39,000 tons of 42-in. and 48-in. water pipe. At the previous opening, the United States Cast Iron Pipe & Foundry Co. was the only bidder on the entire contract, R. D. Wood & Co. having been low bidder on about one-third. On 150 tons of fittings and about 40 tons of pipe for New York, the United States Cast Iron Pipe & Foundry Co., Warren Foundry & Pipe Co. and R. D. Wood & Co. submitted low bids on parts of the tonnage. The Government of the Philippines will open bids June 1 on about 38,000 meters of 4, 5 and 6-in. centrifugal cast iron pipe, alternate bids to be accepted on seamless steel pipe.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, $37.60 to $39.60; 4-in. and 5-in., $42.60 to $44.60; 3-in., $52.60 to $54.60. Class A and gas pipe, $3 extra.

Coke.—Most of the consumers of furnace coke in this district have covered their nearby requirements. Standard furnace is quoted at $2.75 to $2.85 per net ton, Connellsville. Standard foundry ranges from $3.50 to $3.75 per ton, Connellsville. Special brands of foundry coke are quoted at $4.85 per net ton, ovens, or $8.56, delivered to northern New Jersey, Jersey City and Newark, and $9.44 to New York and Brooklyn. By-product coke is quoted at $9 to $9.40 per net ton, Newark or Jersey City, and $10.06, New York or Brooklyn.

Old Material.—In the absence of consumer buying of No. 1 heavy melting steel, the market has begun to exhibit a slight tendency to softness. Brokers with contracts at Claymont, Del., and Coatesville, Pa., are able to secure tonnage at $17 per ton, delivered, instead of $17.50 per ton, the buying price for a fortnight or more. A broker who buys for Bethlehem, Pa., however, has advanced the offering price to $16 per ton, delivered, an increase of 50c. No. 2 heavy melting steel is still going to consumers in the Pittsburgh district, brokers offering $16 and $16.50 per ton, delivered, so that there is no surplus of this grade available for shipment to consumers at Pencoyd, Conshohocken and Phoenixville, Pa. Mixed borings and turnings have been advanced 50c. a ton to $10.50 per ton, delivered, by brokers buying for shipment to Swedeland, Pa., but $9.50 per ton continues to be the price for Bethlehem, Pa. Heavy breakable cast prices show a slight downward tendency, with $16 per ton the maximum offered by consumers. Stove plate is being bought at $12.50 per ton, delivered Harrisburg, Pa.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$13.35 to $13.50
Heavy melting steel (yard)	8.50 to 9.75
No. 1 hvy. breakable cast	12.00 to 12.50
Stove plate (steel works)	8.75 to 9.75
Locomotive grate bars	9.00 to 9.50
Machine shop turnings	7.75 to 8.00
Short shoveling turnings	7.75 to 8.00
Cast borings (blast furn. or steel works)	7.00 to 7.25
Mixed borings and turnings	6.75 to 7.00
Steel car axles	19.25 to 19.75
Iron car axles	24.50 to 25.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	11.75
Forge fire	10.50 to 10.75
No. 1 railroad wrought	12.50 to 13.00
No. 1 yard wrought, long	11.50 to 12.00
Rails for rolling	13.50 to 14.00
Cast iron carwheels	12.50 to 12.75
Stove plate (foundry)	9.00 to 9.50
Malleable cast (railroad)	14.00 to 14.50
Cast borings (chemical)	10.50 to 11.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	$17.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size	15.00
No. 2 cast (radiators, cast boilers, etc.)	14.50

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.70c.
Plates, ⅜-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforc. steel bars, sq. twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.60c.
Cold-fin. steel, sq. and flats	4.10c.
Steel hoops	3.40c.
Steel bands, No. 12 to ⅜-in., inclus.	3.15c.
Spring steel	5.00c.
*Black sheets (No. 24)	4.10c.
†Galvanized sheets (No. 24)	4.85c.
Blue ann'l'd sheets (No. 10)	3.25c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more: 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more: 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Philadelphia

Steel Buying Less Active But Mills Are Well Booked for Quarter—Basic Iron Bought

PHILADELPHIA, April 16. — With most steel consumers covered on their requirements for the quarter, buying has relaxed somewhat in the past week and business is settling down to a steady flow of specifications against contracts. Mill operations are at a high level, and deliveries on most products range from three to five and occasionally six weeks. Black and galvanized sheet prices, which have been subject to some concession from the schedule for this quarter, are developing firmness. While the iron and steel scrap market shows a slight tendency to weakness on some grades, especially No. 1 heavy melting steel, sellers are confident that with the continued high rate of mill operations, a decided decline in prices is not probable. Following substantial purchases of basic iron by consumers in eastern Pennsylvania, prices of basic and foundry grades have been advanced 50c. a ton by furnaces.

Pig Iron. — Eastern Pennsylvania furnaces have announced an advance of 50c. a ton to $21.50 per ton, furnace, for foundry iron and to $20.50 per ton, furnace, for basic. A substantial tonnage of small lots of foundry iron was closed at the former price and a test of the new quotations has not yet developed. Users of basic iron in eastern Pennsylvania have closed for a total of 35,000 tons or more, a Claymont, Del., consumer contracting for upward of 20,000 tons, a Harrisburg mill for about 6000 tons and a Coatesville, Pa., user for 4000 tons. Birmingham foundry iron is appearing as a competitor in this and nearby districts, quotations of Southern furnaces having recently settled to $15 per ton on desirable orders. On all-rail delivery from Birmingham to this district, the freight rate is $6.37 per ton to consumers entitled to the so-called water-competitive rate. On rail and water shipment, by rail to Norfolk and thence by barge, the total rate ranges from $5 to $5.50 per ton. On about 90 tons of 1X iron for the Washington Navy Yard, $15 per ton, base, with $1 extra for silicon, the low bid, was submitted by a Birmingham district furnace. Bids opened at the same time on low phosphorus iron resulted in the award of 230 tons for prompt shipment to an eastern Pennsylvania producer at $26.65 per ton, delivered, and 630 tons, on which prompt delivery was not specified, to a bidder on British low phosphorus iron at $25.50 per ton, delivered. With a freight rate of $1.76 per ton from Baltimore, where the iron will probably be landed, the c.i.f. price was about $23.74 per ton, duty paid.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$21.76 to $22.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	22.26 to 22.76
East. Pa. No. 1X	22.76 to 23.26
Basic (del'd east. Pa.)	20.25 to 21.00
Gray forge	20.50 to 21.00
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. N. Y. State furnace)	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.50 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	24.79
Va. No. 2X, 2.25 to 2.75 sil.	25.29

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Billets.—Consumers are specifying heavily against current contracts at $34 for rerolling and $39, Pittsburgh, for forging quality, but the market is inactive on new business, most mills being disinterested in selling except to regular customers.

Bars.—Mills are heavily booked and offering four to five weeks' delivery on most sizes. Quotations are firm at 1.95c. per lb., Pittsburgh, or 2.27c., delivered Philadelphia.

Reinforcing Bars.—The low bid on the Columbia-Wrightsville, Pa., reinforced concrete bridge, requiring 4000 tons of bars, was submitted by the Wiley, Maxon Construction Co., Dayton, Ohio. Projects requiring reinforcing bar tonnages of considerably less than 100 tons continue a feature of the market. On April 11, the Department of Highways, Pennsylvania, opened general contractors' bids on a reinforced concrete viaduct in Cambria County, on which the low bidder was A. & J. B. Fogel, Hollidaysburg, Pa. Five contracts for reinforced highway construction, on which bids were opened, involved about 200 tons of bars. Billet steel reinforcing bars in 40, 50 and 60-ft. lengths are quoted at 2.05c., Pittsburgh, or 2.37c., delivered Philadelphia, with a $5 extra for cutting to length. Rail steel reinforcing bars are usually quoted at 2c. to 2.05c., delivered Philadelphia, with $5 extra for cutting.

Shapes.—Prices are being maintained at 1.95c. to 2c. per lb., f.o.b. nearest mill to consumer, or 2.01c. to 2.06c., delivered Philadelphia, on a basis of Pencoyd, Pa. While 2.05c., mill, or 2.11c., Philadelphia, is usually obtained on less than carload lots, it is noteworthy that 2c. mill, or 2.08c., Philadelphia, occasionally applies on such purchases. Mills are quoting deliveries of about a week on the larger shapes and two to three weeks on the smaller sizes.

Plates.—Operations continue at a high rate, with business coming chiefly from the railroads, car builders and fabricators. Prices are firm at 2.05c., Coatesville, or 2.15c., delivered Philadelphia. Deliveries range from three to five weeks, depending upon the specifications.

Sheets.—Blue annealed sheet prices continue firm at 2.10c. and 2.20c., Pittsburgh, or 2.42c. to 2.52c., Philadelphia. Recent sales of black and galvanized sheets have been at prices close to the schedule for this quarter, namely, 2.95c., Pittsburgh, or 3.27c., Philadelphia, for black, and 3.70c., Pittsburgh, or 4.02c., Philadelphia, for galvanized. Deliveries of most mills range from three to six weeks, some makers being well booked with black and galvanized sheet tonnage, while others have their capacity engaged with contracts for automobile body sheets.

Imports.—In the week ended April 13, 2000 tons of pig iron, 350 tons of spiegeleisen and 53 tons of steel scrap arrived at this port from the United Kingdom. Ore imports were 2961 tons of chrome ore from Cuba and 2500 tons of manganese ore from Brazil. Arrivals from France consisted of 10 tons of ferrosilicon, 901 tons of steel bars and 19 tons of steel bands. Other imports were 25 tons of structural shapes from Belgium and one ton of iron bars from Sweden.

Old Material.—A slight trend toward weakness appears in certain grades of scrap, but this is attributed by sellers to the lack of consumer purchasing, which was expected last week, rather than to any surplus of material. The available supply of both No. 1 and No. 2 heavy melting steel for this district is said to be not above normal, and, with mill operations at their present rate, sellers do not foresee any decided decline. Heavy breakable cast is quotable at $16 per ton, delivered, the maximum price offered by eastern Pennsylvania consumers. No. 2 heavy melting steel prices are firm, and brokers are paying up to $14.25 per ton to secure sufficient material to fill their contracts with mills at Conshohocken and Pencoyd, Pa.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$17.00 to $17.50
Scrap T rails	16.50 to 17.00
No. 2 heavy melting steel	13.50 to 14.00
No. 1 railroad wrought	16.00 to 16.50
Bundled sheets (for steel works)	11.50 to 12.00
Hydraulic compressed, new	15.00 to 16.00
Hydraulic compressed, old	13.00 to 13.50
Machine shop turnings (for steel works)	11.50 to 12.00
Heavy axle turnings (or equiv.)	14.50 to 15.00
Cast borings (for steel works and roll. mill)	11.00 to 11.50
Heavy breakable cast (for steel works)	16.00
Railroad grate bars	13.00 to 13.50
Stove plate (for steel works)	13.00 to 13.50
No. 1 low phos., hvy., 0.04% and under	21.00 to 22.00
Couplers and knuckles	19.50 to 20.50
Rolled steel wheels	19.50 to 20.50
No. 1 blast f'nace scrap	10.00 to 10.50
Wrot. iron and soft steel pipes and tubes (new specific.)	15.50
Shafting	19.00 to 20.00
Steel axles	23.00 to 23.50
No. 1 forge fire	14.00 to 14.50
Cast iron carwheels	16.50
No. 1 cast	16.50 to 17.00
Cast borings (for chem. plant)	15.00
Steel rails for rolling	17.00 to 17.50

The General Electric Co., Schenectady, N. Y., paid $514,495 in pensions, the majority going to pensioners from the various apparatus works. Since the inception of the company's pension plant $2,129,471 has been paid. On Jan. 1, 1928 there were 607 pensioners, and at the end of the year 877. The average age of those receiving pensions is 68.72 years; the average period of active service, 28.35 years, and the average annual pension, $730.

Murray Iron Works Co., Burlington, Iowa, manufacturer of steam turbines, engines and boilers, announces the following appointments of selling agencies for its products: Frederick E. Bausch, 1605 Chemical Building, St. Louis; T. T. Burchfield Co., 604 Arch Street, Philadelphia, and W. B. Tardy, 74 Knickerbocker Building, Baltimore.

Large Gain in New England Plant Activity

The New England Power Association, which furnishes power to manufacturing plants in important industrial centers of Massachusetts, Rhode Island, and southern New Hampshire and Vermont, has analyzed power delivered for manufacturing purposes in the first quarter of 1929 and found a very considerable increase in activities, particularly in metal industries, since last year. Accepting the consumption of power as a measure of business done by these many plants, the total increase was 14.2 per cent. In metal lines the increase was 31.7 per cent.

Comparison of the two periods is essentially fair, for all plants were excluded from consideration excepting those to which power was furnished in both periods. Customers who had been added in the intervening months, and new departments of old customers, were not figured into the 1929 total. The distribution of power represented was on a scale so broad and in volume so great—at the rate of more than 300,000,000 kwhr. a year—that it is taken as a dependable index of manufacturing business in New England.

In the metals group power consumption increased from 24,916,000 to 32,825,000 kwhr., or 31.7 per cent; in textiles, from 19,746,000 to 20,601,000 kwhr., or 4.3 per cent; in paper, from 17,121,000 to 17,866,000 kwhr., or 4.3 per cent; in rubber, from 4,222,000 to 4,247,000 kwhr., or 0.6 per cent; and in miscellaneous from 2,235,000 to 2,399,000 kwhr., or 7.3 per cent.

British Ceramic Society to Visit United States

A visit to the United States will be made by the Ceramic Society of England, April 28 to May 18. British ceramists are due to arrive on the Laconia at New York, Sunday, April 28, and to be met by officers and members of the seven societies acting as hosts. Hotel Pennsylvania will be headquarters where there will be a complimentary banquet Monday evening, April 29. The following day the guests will start on an itinerary to ceramic and other centers including Perth Amboy and Trenton, N. J.; Philadelphia; Washington; St. Louis; Pittsburgh; Alliance, Ohio; Buffalo; Toronto and Montreal, Canada.

An employment report issued by the Federal Reserve Bank of Chicago for the period Jan. 15 to Feb. 15 reflects the customary seasonal increase in industrial activity. In this period the number of workers increased 2.1 per cent, while payrolls advanced 7 per cent. The vehicle and metal product groups led the expansion, the former with a gain of 3.7 per cent in men and 15.4 per cent in payrolls and the latter with increases of 4 per cent and 9 per cent respectively.

Pacific Coast

Southern Pacific Buys Small Lot of Cars—Inquiries for 2800 Tons of Track Supplies

SAN FRANCISCO, April 13 (*By Air Mail*).—Among the important developments of the week were an inquiry of the Southern Pacific Co. for 2800 tons of track spikes and bolts and the award by the same company of 13 cars. Movement of steel products generally on the Pacific Coast slowed down somewhat, the majority of awards involving unimportant tonnages.

Pig Iron.—Buying is confined to immediate needs. Prices are unchanged.

Prices per gross ton at San Francisco:

*Utah basic	$25.00 to $26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	24.00 to 25.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Bars.—The week brought only one award of reinforcing steel bars in excess of 100 tons. This was 220 tons for an apartment building in Los Angeles, booked by an unnamed interest. Distributers report a fair volume of small jobs and are optimistic as to the outlook for the next few months, now that out-of-stock prices in Los Angeles and in San Francisco are on a firmer basis. On lots of 250 tons, 2.20c., base, is being quoted, with 2.30c. applying on carload lots. On less than carload lots, the price now appears to be firm at 2.60c., base. Among the larger pending projects are 500 tons for an addition to the City-County Building, Seattle, bids on which were opened this week, and 500 tons for buildings in Honolulu for the Dillingham Transport Co. Merchant bars continue firm at 2.35c., c.i.f. Coast ports.

Plates.—The majority of plate inquiries before fabricators call for small lots. Demand is far from active. Bids were opened this week on 240 tons of 4 to 16-in. riveted or welded pipe for Sierra Madre, Cal. Alternate bids were taken on cast iron pipe. Bids were opened last month on 1691 tons for a siphon at Ellensburg, Wash., and a contract has just been awarded on the basis of using a concrete tunnel. No further action has been taken by the Matson Navigation Co. on its inquiry for 13,200 tons for two ships. Prices remain at 2.35c., c.i.f.

Shapes.—A fair number of structural awards were placed during the week, but the majority of them were confined to lots of less than 100 tons. The Pacific Iron & Steel Co. secured 250 tons for airport buildings at Alhambra, Cal.; Western Iron Works booked 200 tons for an apartment building in San Francisco, and the Consolidated Steel Corporation took 175 tons for a bridge for the Pacific Electric Co., Los Angeles. This company was also low on 135 tons for Los Angeles. Plain domestic material continues firm at 2.35c., c.i.f.

Cast Iron Pipe.—Demand for cast iron pipe has fallen off. The United States Cast Iron Pipe & Foundry Co. took 309 tons of 6 and 8-in. Class 150 pipe for Sacramento, Cal. George R. Daley booked 215 tons of 4 and 6-in. Class C pipe for El Prado Avenue, San Diego, and 144 tons of 4 and 6-in. Class B pipe for Plata Avenue, San Diego. Gilroy, Cal., is in the market for 103 tons of 4 to 8-in. Class B pipe. Bids were opened this week on 819 tons of 4 to 16-in. Class 150 for Sierra Madre, Cal., alternate bids having been taken on welded or riveted steel pipe. Importations of cast iron pipe during January totaled 1783 tons, all from French makers, compared with 2991 tons in December, 1928, and 1823 tons in January, 1928.

Railroad Material.—The United States Steel Products Co. booked 1100 gross tons of 82-lb. T rails for the municipal railroad at Seattle. The Southern Pacific Co. has taken bids on 2350 tons of track spikes and 500 tons of track bolts and also has opened bids for 21 gas and electric cars. Recent orders placed by this company include 10 lounge and three observation cars to the Pullman Car & Mfg. Corporation and 16 locomotives to the Baldwin Locomotive Works.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb
Plates and struc. shapes	3.15c.
Soft steel bars	3.15c.
Small angles, 7/8-in. and over	3.15c.
Small angles, under 7/8-in.	3.55c.
Small channels and tees, 3/4-in. to 2 3/4-in.	3.75c.
Spring steel, 1/4-in. and thicker	5.00c.
Black sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	5.30c.
Struct. rivets, 1/2-in. and larger	5.65c.
Com. wire nails, base per keg	$3.40
Cement c't'd nails, 100 lb. keg	3.40

St. Louis

Specifications Heavy for Plates and Blue Annealed Sheets—Pig Iron Market Quiet

ST. LOUIS, April 16.—The pig iron market was very quiet the past week, probably due to the absence from the district of many foundrymen, who were attending the convention in Chicago. The St. Louis Gas & Coke Corporation sold 2700 tons, all for second quarter delivery, including 750 tons of basic to a northern Iowa melter, 500 tons of malleable to a northern Illinois concern, 400 tons of foundry iron to an Illinois stove manufacturer and 300 tons to an implement maker in Illinois. A few sales of Southern iron were made by a leading maker on the basis of $15.50, Birmingham. The Northern market continues firm at unchanged prices.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$20.00
Malleable, f.o.b. Granite City	20.50
N'th'n No. 2 fdy., deliv'd St. Louis	22.16
Southern No. 2 fdy., deliv'd $19.42 to	19.92
Northern malleable, deliv'd	22.16
Northern basic, deliv'd	22.16

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

Coke.—Although the demand for domestic grades of coke has fallen off considerably on account of warmer weather, there is still a good demand for industrial grades.

Finished Iron and Steel.—The Granite City Steel Co. reports that specifications have been heavy for most items, especially so for plates and blue annealed sheets, and it is six to seven weeks behind on plates and seven weeks behind on blue annealed. Business in galvanized sheets is not as good as other products. Tin plate buying is light in this section. Structural business also is light.

Old Material.—The market for old material is very strong, with prices generally unchanged. Sales by railroads have been heavy, but requirements of consumers in the district have been sufficient to absorb all that was offered. The railroad lists have brought good prices. Country dealers continue to hold material for higher prices. Railroad lists include: Louisville & Nashville, 11,000 tons; Chesapeake & Ohio, 7207 tons; Texas & Pacific, 3234 tons; Southern Pacific, 3110 tons; Missouri-Kansas-Texas, 1500 tons; International-Great North-

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.75c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	5.10c.
Blue ann'l'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.30c.
Galv. corrug. sheets	5.15c.
Structural rivets	3.95c.
Boiler rivets	3.95c.
	Per Cent Off List
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-press. nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

ern, 600 tons; Kansas City Southern, 431 tons; Nickel Plate, 35 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel	$13.75 to $14.25
No. 2 heavy melting or shoveling steel	13.00 to 13.50
No. 1 locomotive tires	15.00 to 15.50
Miscel. stand.-sec. rails including frogs, switches and guards, cut apart	15.50 to 16.00
Railroad springs	17.50 to 18.00
Bundled sheets	10.00 to 10.50
No. 2 railroad wrought	13.75 to 14.25
No. 1 busheling	10.00 to 10.50
Cast iron borings and shoveling turnings	9.50 to 10.00
Iron rails	15.00 to 15.50
Rails for rolling	16.50 to 17.00
Machine shop turnings	8.25 to 8.75
Heavy turnings	10.00 to 10.50
Steel car axles	20.50 to 21.00
Iron car axles	28.00 to 28.50
Wrot. iron bars and trans.	22.25 to 22.75
No. 1 railroad wrought	14.00 to 14.50
Steel rails, less than 3 ft.	17.00 to 17.50
Steel angle bars	15.00 to 15.50
Cast iron carwheels	15.25 to 15.75
No. 1 machinery cast	16.00 to 16.50
Railroad malleable	16.00 to 16.50
No. 1 railroad cast	15.00 to 15.50
Stove plate	13.50 to 14.00
Agricult. malleable	15.00 to 15.50
Relay. rails, 60 lb. and under	20.50 to 23.50
Relay. rails, 70 lb. and over	26.50 to 29.00

Gulf States Steel Co. to Build New Mills

The Gulf States Steel Co., Birmingham, is taking bids for the construction of a new sheet mill and a new plate mill at its Alabama City works. Contracts are expected to be let by June 1. The erection of a new blooming mill is being considered, but no definite announcement has been made. Several companies are bidding on the new mills, including the Dwight P. Robinson Co., which had the contract for the new power plant and other improvements recently completed by the Gulf States Steel Co. The company plans to have the new mills ready for operation shortly after the first of the year.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.
	Per Cent Off List
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

Birmingham

Alabama Pig Iron Sold at $15 for Northern Shipment—Steel Mills Continue at a High Rate

BIRMINGHAM, April 16.—The pig iron market shows no improvement. Furnaces are receiving a fairly steady run of small-lot orders interspersed with a few second quarter contracts of importance. The larger melters are much slower in placing contracts than usual, and consequently a large part of the second quarter iron is yet to be sold. Some iron is being sold to Northern and other outside points at $15, but furnace interests continue to maintain the base price of $15.50 for No. 2 foundry in this district. Shipments are falling a little behind the make, and the weekly average is not as good as that of March. Furnace operations are unchanged. Nine are on foundry iron, eight on basic and one on recarburizing iron, a total of 18.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$15.50
No. 1 fdy., 2.25 to 2.75 sil.	16.00
Basic	15.50

Finished Steel.—Usually the spring peak in production has been reached before this time, but now indications are there will be a continuation of the present high rate of production throughout this month at least. Inquiries are strong, bars and structural shapes continuing as the most active items. No change in prices has occurred and a fair degree of firmness is reported. Structural steel fabricators have larger bookings and better operations than at this time last year. The Ingalls Iron Works Co. has booked 400 tons for a car shop at El Reno, Okla., for the Chicago, Rock Island & Pacific Railroad. Reinforcing bar manufacturers are operating on good schedules. The Tennessee company has seven open-hearths in operation at Ensley and seven at Fairfield. The Gulf States Steel Co. continues with five on at Alabama City.

Cast Iron Pipe.—The American Cast Iron Pipe Co. has been awarded 1000 tons for Detroit. Other new orders of this company include 550 tons for Spartanburg, S. C.; 400 tons for Los Angeles; 800 tons for Swanis, B. C., and 400 tons for a private purchaser at Houston, Tex. The United States Cast Iron Pipe & Foundry Co. shared in the tonnage at Detroit and closed a contract for 120 tons of 6-in. pipe for Memphis, Tenn. The McWane Cast Iron Pipe Co. has received an order for 250 tons for Rockmart, Ga. A new order of the Central Foundry Co. calls for 200 tons for Bemis, Ala. Very little tonnage is up for figures, and only a moderate amount is known to be in prospect. Shipments have shown considerable improvement this month. Prices remain at $37 to $38 for 6-in. and larger sizes.

Coke.—Specifications for shipments on second quarter contracts are improving, and foundry coke is moving in good volume. A shipment of 2000 tons to Pacific Coast points was made last week. A few second quarter contracts are being closed. Prices remain at $5 for both spot and contract coke.

Old Material.—Demand is a little stronger and sales have improved slightly. Shipments continue steadily.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$12.50
Scrap steel rails	13.00
Short shoveling turnings	9.00
Cast iron borings	9.00
Stove plate	13.00
Steel axles	21.00
Iron axles	23.00
No. 1 railroad wrought	$10.00 to 10.50
Rails for rolling	14.00 to 15.00
No. 1 cast	14.00
Tramcar wheels	13.00 to 14.00
Cast iron carwheels	13.00 to 13.50
Cast iron borings, chem.	13.50 to 14.00

Boston

Pig Iron Firmer with Buffalo Quotations Now at $19 Base—Scrap Prices Easier

BOSTON, April 16.—A more thorough test of higher pig iron quotations than has yet been afforded since these prices were announced will probably come late this month or early next month, when buying for third quarter is expected to get under way. So far, little interest has been shown by New England foundries in their third quarter requirements. On the small lots which make up the bulk of current business, prices are firm. During the past week the sales of the Mystic Iron Works averaged slightly above $20.50 a ton, furnace. Total sales by all producers did not exceed 3200 tons, of which Mystic sold 1000 tons. The Sullivan Machinery Co., Claremont, N. H., bought 400 tons of Buffalo iron. Several hundred tons of iron also was sold. Low prices on Buffalo iron apparently have disappeared, and $19 is now generally being quoted. Dutch iron is quoted at $22.25 to $22.50 per ton, on dock here. Some may be brought in at Bridgeport, Conn., for some Connecticut hardware manufacturers.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25	$22.41 to $23.91
*Buffalo, sil. 2.25 to 2.75	22.91 to 24.41
East. Penn., sil. 1.75 to 2.25	24.15 to 24.65
East. Penn., sil. 2.25 to 2.75	24.65 to 25.15
Va., sil. 1.75 to 2.25	25.21
Va., sil. 2.25 to 2.75	25.71
Ala., sil. 1.75 to 2.25	21.91 to 24.27
Ala., sil. 2.25 to 2.75	22.41 to 24.77

Freight rates: $4.91 all rail from Buffalo; $3.65 from eastern Pennsylvania; $5.21 all rail from Virginia; $6.91 to $8.77 from Alabama.
*All rail rate.

Coke.—Specifications against first half by-product foundry coke contracts continue on a liberal scale at $11 a ton, delivered within a $3.10 freight rate zone. It is intimated that ovens may open their books next month for second half contracts. The Koppers Co., Pittsburgh, has a contract to build 25 additional ovens for the Providence Gas Co., Providence, R. I. The Providence company, like all other New England coke makers, has greatly increased its domestic fuel sales the past year.

Reinforcing Bars.—Reinforcing bar sales the past week totaled about 400 tons. An increase in the use of welded trusses is cutting somewhat into the reinforcing bar business. Three or four sizable bar jobs are reported to be in the making, the largest a meat storage plant in Somerville, Mass. The base price on bars from stock here is 2.66½c. per lb.

Cast Iron Pipe.—Awards include: Brookline, Mass., 450 tons of 6, 8 and 10-in. pipe to the Warren Foundry & Pipe Co.; Natick, Mass., 200 tons to R. D. Wood & Co.; Fitchburg, Mass., 400 tons of 6 to 12-in. to the Warren Foundry & Pipe Co. and the United States Cast Iron Pipe & Foundry Co. jointly. One municipality will close bids this week on about six miles of pipe. Prices on small pipe are fairly well maintained, but concessions of $1 to $2 a ton are obtainable on large dimensions. Prices quoted openly on domestic pipe are: 4-in., $47.60 a ton, delivered common Boston freight rate points; 6 to 12-in., $43.60 to $44.10; 16 to 20-in., $42.60 to $43.10. The usual $3 differential is asked on Class A and gas pipe.

Old Material.—Despite the great activity of steel mills, the movement of old material out of New England to consuming points is decreasing and prices are easier. A Worcester, Mass., consumer of long bundled skeleton is reported to have purchased a round tonnage at a price equivalent to less than $9.50 a ton on cars here. Heavy melting steel is down 25c. a ton, notwithstanding its scarcity. While most brokers report mixed borings and turnings at $6.50 to $6.75 a ton on cars here, some business was recently closed at $6.25. Quotations on axles have taken a rather sharp drop owing to a slow demand. New England foundries continue to absorb a large tonnage of machinery cast. Automobile scrap is being sold at around $10.50 a ton, on dock here, for export to Danzig. There is a call for railroad malleable at $17.50 to $18 a ton, delivered, but the material appears scarce.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$12.50 to $12.75
Scrap T rails	12.25 to 12.50
Scrap girder rails	11.25 to 11.50
No. 1 railroad wrought	12.00 to 12.50
No. 1 yard wrought	9.50 to 10.00
Machine shop turnings	6.50 to 6.75
Cast iron borings (steel works and rolling mill)	6.75 to 7.00
Bundled skeleton, long	9.50 to 10.50
Forge flashings	10.50 to 11.00
Blast furnace borings and turnings	6.50 to 6.75
Forge scrap	9.50 to 10.00
Shafting	14.50 to 14.75
Steel car axles	16.50 to 17.00
Wrought pipe 1 in. in diameter (over 2 ft. long)	10.50 to 10.75
Rails for rolling	12.50 to 13.00
Cast iron borings, chemical	10.00 to 10.50

Prices per gross ton deliv'd consumers' yards:

Textile cast	$14.50 to $15.00
No. 1 machinery cast	16.00 to 16.50
No. 2 machinery cast	14.00 to 14.50
Stove plate	11.50 to 12.00
Railroad malleable	17.50 to 18.00

pace with output, which remains at full capacity. Backlogs are sufficient to insure production at the current rate for the next 30 days. Bars, shapes and plates are moving in fairly liberal volume. Fabricators are moderately busy on small orders. Common wire nails are quoted at $2.69 per keg, delivered Cincinnati.

Warehouse Business.—Sales in the first half of April were considerably better than in the latter part of March. The price of chain has been advanced from $7.55 to $8.75 per 100 lb.

Coke.—First signs of a recession in demand for by-product foundry coke are reported by a leading district maker, but shipments this month are not expected to fall much below those of March. Prices of by-product and beehive foundry coke are firm and unchanged.

Old Material.—The market is quiet, pending resumption of buying by district steel plants. However, dealers are paying good prices for desirable tonnages of scrap, and railroads are said to be getting as much for their material this month as in March. Borings and turnings probably are the weakest items on the list. Malleable grades are firm, a shortage of stocks adding strength to present quotations.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$13.50 to $14.00
Scrap rails for melting	13.75 to 14.25
Loose sheet clippings	9.75 to 10.25
Bundled sheets	10.75 to 11.25
Cast iron borings	9.00 to 9.50
Machine shop turnings	8.50 to 9.00
No. 1 busheling	10.75 to 11.25
No. 2 busheling	7.00 to 7.25
Rails for rolling	14.50 to 15.00
No. 1 locomotive tires	14.25 to 14.75
No. 2 railroad wrought	13.50 to 14.00
Short rails	18.50 to 19.00
Cast iron carwheels	12.75 to 13.25
No. 1 machinery cast	19.25 to 19.75
No. 1 railroad cast	15.25 to 15.75
Burnt cast	10.50 to 11.00
Stove plate	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	15.50 to 16.00
Agricultural malleable	14.50 to 15.00

Cincinnati

Southern Iron Sold at $15, Birmingham—Coke Demand Declining—Sheet Orders and Specifications Lessen

CINCINNATI, April 16.—Further weakness has appeared in Southern iron, with the result that at least one Alabama maker has booked some orders in Cincinnati at $15, base Birmingham, for delivery during the second quarter. However, cutting of the regular schedule of $15.50 has not become common. Despite the advantage now possessed by Southern furnaces in this district, sales have been in small volume and inquiries are scarce. Most buyers are well covered for the next 60 days and are showing little or no interest in third quarter requirements. Northern iron is quoted at $18.50, base furnace.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	$20.39 to $20.89
Ala. fdy., sil. 1.75 to 2.25	18.69 to 19.19
Ala. fdy., sil. 2.25 to 2.75	19.19
Tenn. fdy., sil. 1.75 to 2.25	19.19
S'th'n Ohio silvery, 8 per cent	27.89 to 28.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Finished Material.—Although the leading independent sheet producer reports a decline in orders and specifications, bookings still are keeping

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex.	3.85c.
Squares	4.35c.
Black sheets (No. 24)	3.90c.
Galvanized sheets (No. 24)	4.75c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg	2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.	8.75
	Net per 100 Ft.
Lap-weld steel boiler tubes, 2-in.	$16.00
4-in.	33.00
Seamless steel boiler tubes, 2-in.	17.00
4-in.	34.00

Apollo Steel May Build Open-Hearth Furnaces

The Apollo Steel Co., Apollo, Pa., is considering plans for the installation of four, five or six open-hearth furnaces on a 150-acre tract of land owned by the company near its finishing mills at Apollo. The plans, which have been under consideration by the company for a long time, require engineering study before a decision can be reached. A bar mill and a blooming mill would also be installed in connection with the open-hearth furnaces, and it is likely that additional finishing mills may be provided. The Apollo company now operates 12 sheet mills, two jobbing mills and six galvanizing pots, and has an annual capacity of 125,000 tons of black, blue annealed and galvanized sheets. A. M. Oppenheimer is president.

Standard Rail & Steel Co., old material dealer, St. Louis, has moved from the Bell Telephone Building to 912 Syndicate Trust Building.

Buffalo

Pig Iron Quiet But Firm—Steel Mills Continue Large Operations—Scrap Strong Despite Smaller Sales

BUFFALO, April 16.—The pig iron market is firm but quiet. No large volume of inquiry has followed the recent tightening in prices. The inquiry of the New York Air Brake Co. for 500 tons of foundry and 1500 tons of malleable is still pending. From points east an inquiry for 600 tons of foundry and another for 500 tons of foundry have been received. There are scattered inquiries for 400 or 500 tons, made up of small lots. One furnace interest, which is practically out of the market for the second quarter, is quoting its regular second quarter prices for the third quarter. There is no disposition to shade prices for any delivery. The Wickwire-Spencer Steel Corporation is relining its larger furnace. Producers are looking for a fairly quiet period until June, when a considerable tonnage is expected to come out.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$18.50 to $19.50
No. 2X fdy., sil. 2.25 to 2.75	19.00 to 20.00
No. 1 fdy., sil. 2.75 to 3.25	20.00 to 21.00
Malleable, sil. up to 2.25	19.00 to 20.00
Basic	17.50 to 18.50
Lake Superior charcoal	27.28

Finished Steel.—The market is enjoying an era of activity almost without precedent. Mills are operating very close to capacity and are falling further behind on almost all deliveries. Bar deliveries by one mill have been lengthened to eight weeks and shape and sheet deliveries have also been retarded. Sales agencies here for hot-rolled strip report a heavy volume of business, mills being sold up to the middle of June. Cold-rolled strip is also very active. Nuts and bolts are strong, with considerable business being placed. Reinforcing bars are quite active.

Old Material.—The market during the past week was not featured by any large sales, but the whole list remains quite firm. A sale of No. 1 heavy melting steel was made at $17.50, but most of the large buyers are remaining out of the market despite heavy operations. Malleable scrap is strong, and there have been some sales at $19.75 to $20.00. Specialties have been moving well, knuckles and couplers, coil and leaf springs, and rolled steel wheels having been sold at $19.50 to $20. Short steel rails are strong at $19.50 to $20 and very scarce. For No. 2 heavy melting steel, dealers are offering as high as $14.75.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades	
No. 1 heavy melting steel	$17.50 to $17.75
No. 2 heavy melting steel	14.75 to 15.00
Scrap rails	17.00 to 18.00
Hydraul. comp. sheets	14.75 to 15.00
Hand bundled sheets	12.00 to 12.50
Drop forge flashings	14.00 to 14.50
No. 1 busheling	16.50 to 16.75
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	7.75 to 8.00
No. 1 railroad wrought	13.50 to 14.00
Acid Open-Hearth	
Knuckles and couplers	19.50 to 20.00
Coil and leaf springs	19.50 to 20.00
Rolled steel wheels	19.50 to 20.00
Low phos. billet and bloom ends	20.00 to 20.50
Electric Furnace Grades	
Short shov. steel turnings	12.00 to 12.50
Blast Furnace Grades	
Short mixed borings and turnings	11.50 to 12.50
Cast iron borings	11.50 to 12.25
No. 2 busheling	10.00 to 10.50
Rolling Mill Grades	
Steel car axles	18.75 to 19.25
Iron axles	21.00 to 22.00
Cupola Grades	
No. 1 machinery cast	16.00 to 17.00
Stove plate	14.50 to 15.00
Locomotive grate bars	13.50 to 14.00
Steel rails, 3 ft. and under	19.50 to 20.00
Cast iron carwheels	14.00 to 14.50
Malleable Grades	
Industrial	19.75 to 20.00
Railroad	19.75 to 20.00
Agricultural	19.50 to 20.00
Special Grades	
Chemical borings	14.00 to 14.50

Structural Steel.—The demand for steel for buildings and bridges continues the principal feature of the iron and steel industry of this country. Fabricating plants are not only running at capacity, but have enough orders on their books to maintain present operations well through the year. While most of the orders closed during the week ranged from 100 to 1000 tons, a few contracts from 1000 to 5000 tons were also closed. The Dominion Bridge Co., Lachine, Que., received an award of 5000 tons for a power development plant at High Falls, Que., for the MacLaren Fir Co. The Canadian Bridge Co., Walkerville, Ont., shared with the Hamilton Bridge Co. the 12,000-ton steel contract for the Canadian Bank of Commerce Building at Toronto.

Old Material.—Spot sales are in good volume, with consumers buying in large tonnage for immediate needs. Prices are unchanged.

Dealers' buying prices:

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel	$9.50	$8.50
Rails, scrap	11.00	9.00
No. 1 wrought	9.50	12.00
Machine shop turnings	7.50	5.00
Boiler plate	7.50	6.00
Heavy axle turnings	8.00	7.50
Cast borings	7.50	5.00
Steel turnings	7.50	6.50
Wrought pipe	5.50	6.00
Steel axles	15.00	20.00
Axles, wrought iron	17.00	22.00
No. 1 machinery cast	....	17.00
Stove plate	....	13.00
Standard carwheels	....	16.00
Malleable	....	13.00
	Per Net Ton	
No. 1 mach'ry cast	$16.00	....
Stove plate	9.50	....
Standard carwheels	14.00	....
Malleable scrap	14.00	....

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.75c.
Cold-fin. flats, sq. and hex.	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$3.60
Black wire, base per 100 lb.	3.75

Canada

Structural Steel Demand Features Business

TORONTO, ONT., April 16.—Neither the recent advance of 50c. per ton nor the reported possibility of further advances has so far had any marked effect on business in the Canadian pig iron markets. The majority of melters covered their second quarter needs at the former price of $23.60, Toronto. The advance chiefly affects hand-to-mouth buyers, and these are now under the necessity of paying the increased price. The demand for spot iron continues active. Orders range from 50 to 500 tons, with inquiries in good volume, indicating a continued strong demand. Sales for the week amounted to 2000 tons for distribution in the Toronto and Montreal districts.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$24.10
No. 2 fdy., sil. 1.75 to 2.25	24.10
Malleable	24.10
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$25.50 to $26.00
No. 2 fdy., sil. 1.75 to 2.25	25.50 to 26.00
Malleable	25.50 to 26.00
Basic	24.50 to 25.00
Imported Iron, Montreal Warehouse	
Summerlee	$33.50
Carron	33.00

Youngstown

Steel Ingot Production Increased this Week

YOUNGSTOWN, April 16.—Mahoning county commissioners this week awarded to the American Bridge Co. the contract to build the South Avenue viaduct on its bid of $233,950, work to be completed in September. Only one other bid was received, from the Fort Pitt Bridge Works Co., Pittsburgh, for $262,900.

Due to improved conditions in rolled steel, the 48-in. universal mill at the Farrell, Pa., works of the Carnegie Steel Co., has been ordered into production after two years' idleness.

The Sharon Steel Hoop Co. is operating its new hot strip mill at Sharon, Pa., two turns per day this week, against one turn heretofore, while the unit was being "broken in."

Steel ingot production mounts this week in the Mahoning Valley, with resumption of a number of open-hearth furnaces which had been down for repairs. Independent strip and tin plate mills are operating at virtually a capacity rate. Pipe mill departments are operating 55 per cent, against 50 per cent last week. While there is less urgency in the requirements for automobile steels, this condition is not yet being reflected in lower operating schedules of steel plants.

Steel Corporation to Issue Stock at $140

One New Share to Every Holder of Seven — Prosperous Conditions Told at Stockholders' Meeting

THE new issue of common stock of the United States Steel Corporation will be made at $140 per share to stockholders of record May 1 and in the ratio of one share for every seven then held. The board of directors so voted at a meeting held April 16, following the authorization by the stockholders' meeting in Hoboken, N. J., the day before. There being 7,116,235 shares now outstanding, the new issue will amount to 1,016,605 shares and will bring to the corporation treasury to apply against retiring the $305,000,000 of 5 per cent bonds (including premiums) a total of $142,324,700.

Purchasers may buy outright on June 21, or pay 50 per cent then and the remaining 50 per cent on Oct. 1. The 50-yr. bonds will be retired on Sept. 1, but no action was taken with respect to the 10-60-yr. bonds, though the present intention is to call this issue for payment on Nov. 1.

The stockholders in the annual meeting approved the proposal to increase the authorized common stock to 12,500,000 shares, from 7,533,210 shares, of which 7,116,235 shares are now outstanding. The proposal to reduce authorized preferred stock to 4,000,000 shares, from 5,500,000, also was approved. There are 3,602,811 shares of preferred now outstanding.

A stockholder pointed out that United States Steel Corporation had earned only 3.3 per cent on the employment of its surplus last year as compared with 4.16 per cent in 1927, whereas other large industrials obtained much higher interest on their surplus. He referred to this as a poor showing and indicating that the surplus was being inefficiently employed.

Myron C. Taylor, chairman of the finance committee, who presided, replied that the surplus is represented largely in plants and working capital, and is not free for employment in investments. Because of the great magnitude of the corporation's operations and the widespread activities, the corporation, he said, should have sufficient balances in banks, not only at home, but wherever it is engaged in trade. Those directing the corporation believed it impossible, he added, to carry on its business properly without deposits in over 100 banks scattered about the world.

Mr. Taylor described the research department of the Steel Corporation as slowly but definitely assembling a group of selected scientists from different parts of the world to begin operations to advance the many new ideas of the steel business. The corporation now has 150 laboratories and 2000 research men, he added, in its various plants throughout the world. The central research laboratory is at Kearny, N. J.

A $1,500,000,000 Year

President James A. Farrell told stockholders that the corporation was operating at 96 per cent and at the present rate of business sales this year should reach $1,500,000,000.

"We have to spend to rehabilitate our plants and expand our business approximately $100,000,000 annually," said Mr. Farrell. "We have a program," he continued, "extending over three years. Our steel capacity for several years has shown a small decline every year. In the past five years our competitors have increased their ingot capacity a matter of about 8,250,000 tons. During that period our ingot capacity has increased only 1,700,000 tons. What we have been doing is to concentrate our properties, through more efficient points of location, thereby affecting great economies. We have been further expanding the diversification of our product.

Orders to Carry Through August

"Our immediate outlook is good. We have orders enough on our books at the present time to carry us through August and we are putting them on the books every day. In March we shipped nearly 57,000 tons a day and booked 66,000 tons."

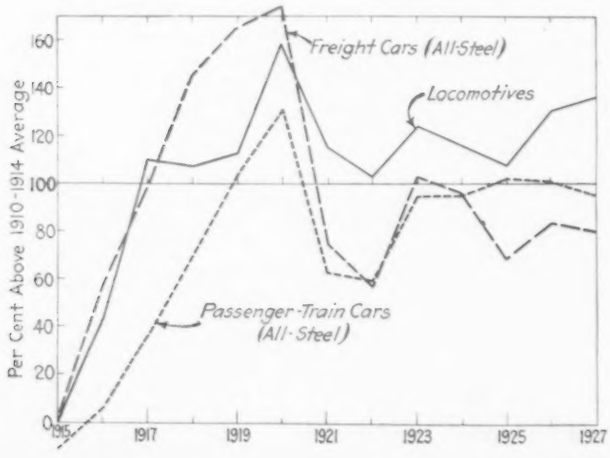
Cost of Railroad Equipment Double Pre-War

IT has been found on extended analyses that the recent cost of locomotives and steel cars, both passenger and freight, is about double the average prevailing in the five years 1910 to 1914 inclusive. An article by H. E. Hale, vice-chairman of the Railroad Presidents' Conference Committee, published by *Railway Age*, tells how the present prices were arrived at and how they compare with those prevailing before the war.

All figures were worked out on the basis of cents a pound for different types of equipment and then plotted in accordance with weight schedules. It was found, as would have been supposed, that the heaviest types of locomotives cost less for each pound than did the lighter units. The same was true of other pieces of equipment. The study was made in connection with the valuation of railroads by the Interstate Commerce Commission, which has been going on for more than a decade.

In valuing old equipment on the basis of present reproduction cost the railroads have used modern specifications. This was criticized by a Government official, who claimed that present specifications were better than the old ones and consequently would result in too high a price. This statement was answered by calling attention to the fact that the old specifications included such items as Russia jacket iron, walnut cabs, many brass fittings and, in some cases, hammered iron frames. These would cost much more to the pound than the material of modern specifications. This statement ended the argument.

The curves in the appended diagram represent locomotives, steel passenger train cars of all classes and all-steel freight cars. The trend lines are based on actual weighted average prices to the pound of 26,000 locomotives, 11,000 passenger train cars and (in the original paper) 790,000 freight cars. In the latter case, the data for wooden freight cars and for those of composite construction of wood and steel are here omitted; hence, that curve is based on a smaller number than 790,000, but still a very large number.



RECENT Railroad Rolling Stock Purchases Have Been Below the 1920 Peak, But About Double the 1910-1914 Average. Locomotives have held at the highest level of all, since 1920

Non-Ferrous Metal Markets

Copper Declines Sharply, Tin Active and Lower, Lead Down ¼c. Per Lb., Zinc Inactive and Lower

THE WEEK'S PRICES, CENTS PER POUND, FOR EARLY DELIVERY

	Apr. 16	Apr. 15	Apr. 13	Apr. 12	Apr. 11	Apr. 10
Lake copper, New York	18.12½	19.25	19.25	19.25	19.50	19.50
Electrolytic copper, N. Y.*	17.75	18.25	19.00	19.00	19.25	19.25
Straits tin, spot, N. Y.	45.62½	45.25	....	45.80	46.62½	46.37½
Zinc, East St. Louis	6.65	6.70	6.70	6.70	6.70	6.70
Zinc, New York	7.00	7.05	7.05	7.05	7.05	7.05
Lead, St. Louis	6.85	6.85	6.85	6.85	6.85	6.85
Lead, New York	7.00	7.00	7.15	7.15	7.15	7.15

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

NEW YORK, April 16.

Copper.—Copper prices have again declined. Electrolytic copper was sold today in fairly large quantities at 18c., delivered in the Connecticut Valley. Consumers have held steadily aloof the past week, and, as a result, prices began to ease yesterday, when quotations ranged from 19.25c. down to 18c. At this level it was found that consumers were willing to buy and the market has been quite active. The quotation of Copper Exporters, Inc., was established today at 18.30c., c.i.f. European ports. Sales abroad have been almost nothing in recent days, only 10 tons having changed hands today and 15 tons yesterday. In Lake copper almost no business is being done with quotations nominal at 18c. to 18.12½c., delivered. Large producers are selling very little, if any, most of the business being taken by custom smelters. The opinion prevails that the bottom has been reached and that more general selling by all interests will now develop. Statistics for March showed a decline in refined stocks of 2300 tons and of 1000 tons in refined and blister stocks combined. Deliveries into consumption were a record at over 165,800 tons, of which 105,860 tons went to domestic consumers. Production of refined metal, also a record, was more than 163,500 tons. Output at the mines was 8632 tons, slightly exceeding the best recent record of 8600 tons in October.

Tin.—Prices have again declined, despite attempts to support the stock market, which has had its influence on this and other metal markets. Sales of Straits tin for the week ended Saturday, April 13, were 1600 tons, much the largest in many weeks. The biggest day was April 9 at 600 tons, followed by 500 tons on April 12. Following these heavy purchases, buyers showed less interest and decided to wait for lower prices. The market has been very quiet since. Several London houses were keen sellers and another upsetting factor was the collapse in the copper market early in the week. Consumption is keeping up at a rapid pace and estimates for April put the total at 8000 tons or higher. This is again very large on top of exceedingly heavy deliveries in the first quarter. Yesterday, in a quiet market, 150 tons

Rolled Products

Because of the break in ingot copper prices, mill base prices on rolled copper and brass products are in a confused state. Copper products are down at least 6c. per lb. and brass products 4c. However, these are only nominal. Definite prices will not be made until the copper market has been stabilized. There has been no change in the prices of zinc and full lead sheets.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass	23.12½c.*
Copper, hot rolled	27.75c.*
Zinc	10.25c.
Lead (full sheets)	11.00c. to 11.25c.
Seamless Tubes—	
High brass	28.00c.*
Copper	29.12½c.*
Rods—	
High brass	20.87½c.*
Naval brass	23.50c.*
Wire—	
Copper	19.87½c.*
High brass	23.62½c.*
Copper in Rolls	26.75c.*
Brazed Brass Tubing	31.12½c.*

*Nominal.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	33.00c.
Tubes, base	42.00c.
Machine rods	34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—	Base per Lb.
High brass	27.12½c.
Copper, hot rolled	33.75c.
Copper, cold rolled, 14 oz. and heavier	36.00c.
Zinc	10.00c.
Lead, wide	11.90c.
Seamless Tubes—	
Brass	32.00c.
Copper	35.12½c.
Brass Rods	24.87½c.
Brazed Brass Tubes	35.12½c.

New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass	27.12½c. to 28.12½c.
Copper, hot rolled base sizes	33.75c. to 34.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes	37.00c. to 38.00c.
Seamless Tubes—	
Brass	32.00c. to 33.00c.
Copper	35.12½c. to 36.12½c.
Brazed Brass Tubes	35.12½c. to 36.12½c.
Brass Rods	24.87½c. to 25.87½c.

New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks	10.50c. to 11.00c.
Zinc sheets, open	11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices Per Lb.

Tin, Straits pig	48.00c. to 49.00c.
Tin, bar	50.00c. to 51.00c.
Copper, Lake	21.00c. to 22.00c.
Copper, electrolytic	20.75c. to 21.75c.
Copper, casting	20.50c. to 21.50c.
Zinc, slab	8.00c. to 8.50c.
Lead, American pig	8.00c. to 8.50c.
Lead, bar	10.00c. to 10.50c.
Antimony, Asiatic	11.50c. to 12.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy,	24.00c. to 25.00c.
Babbitt metal, commercial grade,	30.0uc. to 40.00c.
Solder, ½ and ½	30.75c. to 31.75c.

Metals from Cleveland Warehouse

Delivered Prices Per Lb.

Tin, Straits pig	50.75c.
Tin, bar	52.75c.
Copper, Lake	20.50c.
Copper, electrolytic	20.25c.
Copper, casting	20.00c.
Zinc, slab	7.75c. to 8.00c.
Lead, American pig	7.75c. to 8.00c.
Lead, bar	10.00c.
Antimony, Asiatic	16.00c.
Babbitt metal, medium grade	19.00c.
Babbitt metal, high grade	54.75c.
Solder, ½ and ½	33.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged customers after the metal has been properly prepared for their uses. Owing to the unsettled condition of the market these prices are nominal.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	14.00c.	16.00c.
Copper, hvy. and wire	13.50c.	15.00c.
Copper, light and bottoms	12.50c.	14.00c.
Brass, heavy	9.00c.	10.00c.
Brass, light	8.00c.	9.00c.
Hvy. machine composition	11.50c.	13.00c.
No. 1 yel. brass turnings	10.50c.	11.50c.
No. 1 red brass or compos. turnings	11.00c.	12.00c.
Lead, heavy	5.50c.	6.25c.
Lead, tea	4.75c.	5.25c.
Zinc	3.50c.	4.00c.
Sheet aluminum	13.50c.	15.50c.
Cast aluminum	12.00c.	14.00c.

changed hands and today a fair business was done, with spot Straits tin quoted at 45.62½c., New York, the advance today over yesterday being due to recoveries in London. In that market spot standard was quoted at £205 2s. 6d., future standard at £205 17s. 6d., and spot Straits at £206 12s. 6d. The Singapore price today was £207 15s. Tin is now at the lowest price since last summer.

Lead. — Two reductions by the American Smelting & Refining Co. were made during the week, the last one yesterday to 7c., New York, as the contract price. So far this month this is the fourth reduction, a total decline of ¾c. a lb. At St. Louis the quotation is more or less nominal at 6.85c. Business is reported as moderately active, with sales being made through May.

Zinc.—Almost no business is reported in prime Western zinc and the market could hardly be more inactive. Quotations are lower, at 6.65c., East St. Louis, or 7c., New York, but largely nominal. Some quote a range of 6.60c. to 6.70c., East St. Louis. Zinc has been sympathetically affected by the weakness in copper, tin and lead. A strengthening factor is found in the statistics for March, which show a reduction in refined stocks of about 2600 tons and a decline in the number of retorts operating at the end of March.

Antimony.—Chinese metal is offered in a quiet market at 9.75c., New York, duty paid, for spot delivery, with futures at 9.50c.

Nickel.—Wholesale lots of ingot and shot nickel are unchanged at 35c. and 36c., respectively. Electrolytic nickel in cathodes is quoted at 35c. per lb.

Aluminum.—Virgin metal, 98 to 99 per cent pure, continues unchanged with the published price at 23.90c. per lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, April 16.—Sales in this market are quiet while buyers closely watch the adjustment in prices. Quotations for all commodities are lower. The old metal market is dull and prices are weak.

Prices per lb., in carload lots: Lake copper, 19.87½c.; tin, 46c.; lead, 6.75c. to 7.10c.; zinc, 6.75c.; in less-than-carload lots: antimony, 10.37½c. On old metals we quote copper wire, crucible shapes and copper clips, 14.50c.; copper bottoms, 12.50c.; red brass, 12.50c.; yellow brass, 9c.; lead pipe, 5c.; zinc, 3.62½c.; pewter, No. 1, 25.50c.; tin foil, 27c.; block tin, 37c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Railroad Equipment

Northern Pacific Orders 500 Cars; Union Pacific Will Buy 500

THE Northern Pacific order for 500 automobile cars was the only railroad equipment business of importance in the week. The Union Pacific came into the market for 500 all-steel automobile cars. Although recent purchasing has been heavy, definite inquiries which have not yet resulted in orders will, if placed, add nearly 6000 more units to those now on car builders' books. There is the recent inquiry of the Baltimore & Ohio for 3000 and that of the Chicago & North Western of a few weeks ago for 2500. In addition, the Missouri Pacific has net yet closed for 200 flat cars and 100 stock cars, and the Southern Pacific's inquiry for 50 caboose cars and 65 gondola cars is still pending. The week's business is given in detail as follows:

Union Pacific will buy 500 all-steel automobile cars.

Northern Pacific has ordered 500 automobile cars from Pacific Car & Foundry Co.

Southern Pacific Co. has ordered 10 lounge and three observation cars from Pullman Car & Mfg. Corporation, and 16 locomotives from Baldwin Locomotive Works. It has also taken bids on 21 gas and electric cars. This railroad will build in its own shops 300 flat cars, 65 gondola cars and 50 cabooses. It is reported that it has decided not to purchase 250 tank cars.

Erie Railroad has ordered 10 baggage express cars from Pullman Car & Mfg. Corporation.

New York Central has ordered 30 milk cars from Merchants' Despatch, Inc.

Cincinnati, Hamilton & Dayton has ordered six Hart convertible ballast cars from American Car & Foundry Co.

Reinforcing Steel

Awards of 2500 Tons, Mostly in Small Lots

REINFORCING steel awards reported the past week amounted to about 2500 tons, one of the smallest totals this year. New projects also fell off and call for only 940 tons. Awards follow:

NEW YORK, 280 tons, subway section 7, route 109, Hart & Early Co., Inc., general contractor; to Igoe Brothers.

WESTCHESTER COUNTY, N. Y., 200 tons, County parkway, to Kalman Steel Co.

CHICAGO, 325 tons, building for American Bank Insurance Co., to Jones & Laughlin Steel Corporation.

CHICAGO, 200 tons, hotel at 20 South Desplaines Avenue, to Inland Steel Co.

CHICAGO, 275 tons, apartment building, to Inland Steel Co.

CHICAGO, 175 tons, hospital at University of Chicago, to Inland Steel Co.

ROCKFORD, ILL., 200 tons, building for *Rockford Republic*, to Olney J. Dean & Co.

LITTLE ROCK, ARK., 600 tons, Arkansas Highway Commission, to Laclede Steel Co.

LOS ANGELES, 220 tons, apartment building, Ninth Street and Serrano Avenue, to unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEW YORK, 130 tons, warehouse for Santini Brothers, Inc., 609 Jackson Avenue; general contract not yet awarded.

WRIGHTSVILLE, PA., 4000 tons, Columbia-Wrightsville bridge; Wiley, Maxon Construction Co., Dayton, Ohio, low bidder on general contract.

CHICAGO, 130 tons, laboratory for University of Chicago.

CHICAGO, 450 tons, Chicago City Bank Building.

SACRAMENTO, CAL., 231 tons, paving in Siskiyou County; bids May 8.

Resists Salt Water for Fourteen Years

THE hull of the yacht Resolute, made of manganese bronze plates manufactured by the Taunton-New Bedford Copper Co., Taunton, Mass., has resisted the action of salt water for 14 years without paint or protection. The same company supplied the copper sheathing for "Old Ironsides," more than a century ago.

Non-Ferrous Ingot Orders Unfilled on April 1

CHICAGO, April 15.—On April 1, unfilled orders for brass and bronze ingots and billets on the books of the members of the Non-Ferrous Ingot Metal Institute amounted to a total of 22,755 net tons, according to an announcement of the Institute issued today.

While these and other statistics will be given publicity regularly in the future, the facilities for gathering such data are of recent origin. Accordingly, there are no statistics available as yet for comparison with previous corresponding periods.

Fabricated Structural Steel

Awards of About 58,000 Tons Smaller Than Recent Weeks —Tonnage in New Projects Still Large

STEEL for subway construction in New York totaling 16,700 tons and about 17,000 tons for the Department of Commerce Building in Washington, made up more than half the awards reported the past week. Other sizable tonnages placed include 4500 tons for a sheet mill at Monroe, Mich., and 4000 tons for an office building in New York. The larger projects in a total of almost 25,000 tons pending are a court house at Camden, N. J., 4000 tons; bridges for the Chicago & North Western, 5000 tons; car ferries for the Wabash Railway, 4000 tons. Awards follow:

CAMBRIDGE, 140 tons, Christian Science Church addition, to Boston Bridge Works, Inc.

BOSTON, 125 tons, three lighters for Eastern Steamship Lines, Inc., to American Bridge Co.

STATE OF CONNECTICUT, 200 tons, highway bridges, to unnamed fabricator.

NEW YORK, 16,700 tons for subway work; 9200 tons, section 3, route 108; 7000 tons, section 4, route 108; 500 tons, substations two and three, to American Bridge Co.

NEW YORK, 1370 tons, warehouse for New York Central Railroad at Kingsbridge yards, to McClintic-Marshall Co.

NEW YORK, 1000 tons, city museum, to Hinkle Steel Construction Co.

NEW YORK, 4000 tons, office building, Forty-first Street and Madison Avenue, to A. E. Norton, Inc.

NEW YORK, 1000 tons, Hebrew Seminary at Broadway and 122nd Street, to Bethlehem Fabricators, Inc.

NEW YORK, 5000 tons, building for American Sugar Refining Co. on Wall Street, to Hay Foundry & Iron Works.

STATE OF NEW YORK, 315 tons, highway bridges, to American Bridge Co.

LONG ISLAND RAILROAD, 435 tons, five bridges and 18 high tension power line poles to Shoemaker Bridge Co.

BRISTOL, PA., 125 tons, factory for Keystone Aircraft Corporation, to Belmont Iron Works.

CAMDEN, N. J., 165 tons, building for Airport Development Corporation, to Belmont Iron Works.

WASHINGTON, 17,000 tons, building for Department of Commerce, to American Bridge Co.

OLD HICKORY, TENN., 550 tons, building for Du Pont Engineering Co., to Virginia Bridge & Iron Works.

NEWELL, W. VA., 1000 tons, addition to pottery plant of Homer Laughlin China Co., to Fort Pitt Bridge Co.

CLEVELAND, 120 tons, Members Garage, to Pittsburgh Bridge & Iron Co.

CLEVELAND, 425 tons, Ohio Bell Telephone Building, to American Bridge Co.

MICHIGAN CITY, IND., 240 tons, building for Sullivan Machinery Co., to Worden-Allen Co.

MONROE, MICH., 4500 tons, sheet mill plant for Newton Steel Co., to Whitehead & Kales Co.

MILWAUKEE, 100 tons, building for International Harvester Co., to Worden-Allen Co.

CHICAGO, ROCK ISLAND & PACIFIC, 130 tons, bridge, to American Bridge Co.

CHICAGO, 750 tons, apartment building at 1301 Astor Street, to an unnamed bidder.

EL RENO, OKLA., 400 tons, car shop for Chicago, Rock Island & Pacific Railroad, to Ingalls Iron Works.

PONCA CITY, OKLA., 1000 tons, power house for Oklahoma Gas & Electric Co., to Kansas City Structural Steel Co.

LOS ANGELES, 175 tons, overpass on La Cienega Boulevard for Pacific Electric Railway, to Consolidated Steel Corporation.

ALHAMBRA, CAL., 250 tons, airport buildings, to Pacific Iron & Steel Co.

SAN FRANCISCO, 121 tons, warehouse addition, Twentieth and Indiana Streets, to Mortensen Construction Co.

SAN FRANCISCO, 120 tons, hotel, Fillmore and Fulton Streets, to McClintic-Marshall Co.

SAN FRANCISCO, 200 tons, apartment building, Pine and Monroe Streets, to Western Iron Works.

LOS ANGELES, 150 tons, high school on Ninety-second Street, to unnamed fabricator.

WENATCHEE, WASH., 100 tons, junior high school, to Wallace Bridge & Structural Steel Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

BOSTON, 1200 tons, Boston & Maine Railroad hotel addition.

BOSTON, 140 tons, building on Newbury Street.

MAINE-NEW BRUNSWICK, 700 tons, bridge.

CAMBRIDGE, MASS., 500 tons plates, four tanks for Lever Brothers Co.

CAMBRIDGE, 100 tons, Harvard gymnasium.

NEW YORK, 1000 tons, New York Central Railroad warehouse on West End Avenue.

NEW YORK, 1200 tons, laboratory for Rockefeller Institute on Sixty-sixth Street.

PORT WASHINGTON, N. Y., 600 tons, building for American Aeronautical Co.

CAMDEN, N. J., 4000 tons, Camden County Court House.

CLEVELAND, 300 tons, New York Central Railroad bridge at West 117th Street and Berea Road.

CLEVELAND, 200 tons, warehouse for Nickel Plate Railroad.

LANSING, MICH., 800 tons, building for General Motors Corporation.

NIAGARA, WIS., 300 tons, interstate bridge to Iron Mountain, Mich.; bids close May 3 with village clerk, Niagara.

EVANSTON, ILL., 600 tons, nurses' home.

CHICAGO & NORTH WESTERN, 5000 tons, 1929 bridge program.

WABASH RAILWAY, 4000 tons, car ferries.

CHICAGO, ROCK ISLAND & PACIFIC, 500 tons, bridges.

SAN FRANCISCO, 260 tons, office addition, 340 Sansome Street; bids received.

LOS ANGELES, 135 tons, grade separation on Railroad Avenue; Consolidated Steel Corporation, low bidder.

SEATTLE, 3000 tons, building for Fisher Body Corporation.

Will Consider Credit and Business Finance

A cross-section of American business opinion of the present credit situation will be brought out in a round-table conference on business finance and the credit supply at the seventeenth annual meeting of the Chamber of Commerce of the United States at Washington, April 29 to May 3.

In announcing the program for this special meeting, William Butterworth, president of the National Chamber, pointed ont that "new methods of corporation finance have reorganized the financial structure of industry. Sound practices of only a few years ago are now obsolete. The relationship between banks and other business houses, between our credit and banking system and our investment and speculative agencies, are in a process of change. The holding company, the investment trust, the mergers and consolidations of the present day have altered our concept of business finance. Financial happenings abroad, such as reparation revision and security flotations, have an effect upon our domestic trade. It is important that those phases of the business credit situation be reviewed periodically."

The discussion is expected to bring to the surface answers to such questions as:

Is there a sufficient supply of credit for the normal expansion of American business?

Are any industries or sections suffering from credit?

What are the effects upon commerce and industry of the uses of credit on the stock market?

What are the proper relationships of the Federal Reserve System to the security market?

What legitimate functions does security speculation perform?

What considerations should determine changes in the Federal Reserve rediscount rates?

Is any new legislation necessary?

New developments of corporate finance is another important topic to be discussed. The questions listed for consideration under this heading are:

Is the new tendency to sell capital stock, instead of borrowing, wise finance?

Has the relationship of the corporation to its bank of deposit changed fundamentally?

Is there a public demand for more information in financial reports?

What are some of the problems ahead of investment trusts?

Are there new benefits to be gained from modern mergers and consolidations?

Illinois Commerce Commission has granted permission to Texas-Empire Pipe Line Co. to lay 150 miles of 8-in. oil pipe in 12 counties in Illinois.

Gary Mill to Use Continuous Sheet Process

United States Steel Corporation Licensed by American Rolling Mill Co.—Third to Make Such Contract

JAMES A. FARRELL, president, United States Steel Corporation, has made the following statement in response to an inquiry as to whether the corporation had entered into an arrangement to use the patents of the American Rolling Mill Co.:

"After an investigation extending over a considerable period in continuous sheet mill rolling, our engineers have recommended that the corporation authorize the American Sheet & Tin Plate Co., its subsidiary, to take out a license from the American Rolling Mill Co. to utilize its patents in the continuous rolling of sheet metal at our Gary sheet and tin plate mills, and also for any of this type mills which the corporation may build during the next 14 years, which constitute the life of the patents, and accordingly an arrangement has just been concluded between the respective companies."

The American Sheet & Tin Plate Co. is the third sheet producer to be licensed to use the American Rolling Mill Co. patents, similar arrangements having been made some time ago with the Wheeling Steel Corporation and the Weirton Steel Co.

Improvements completed during the past year at the Gary plant of the American Sheet & Tin Plate Co. have centered chiefly in the tin plate department, which has been modernized and increased in capacity at least 50 per cent.

Mechanical Engineers Meet in Rochester in May

The program of the Rochester, N. Y., meeting of the American Society of Mechanical Engineers, to be held May 13 to 16, covers sessions on boiler furnace refractories, education, applied mechanics, heat transmission, gears, materials handling, aeronautics and management. Some of the papers announced are as follows:

"Some Factors in Removal of Ash as Molten Slag from Powdered-Coal Furnaces," Ralph A. Sherman, P. Nicholls and Edmund Taylor.

"Present Status of Tests for Refractories," S. M. Phelps and J. S. McDowell.

"Proprietary Air-Cooled Refractory Walls," Charles S. Gladden.

"British Apprenticeship Report and Its Value to American Industry," William S. Conant.

"Calculation of Flywheels for Air Compressors," H. R. Goss and H. V. Putman.

"Formation and Heat Transfer Effects of Calcium Sulphate Boiler Scale," E. P. Partridge and A. H. White.

"Control of Boiler Water Treatment to Prevent Embrittlement," Frederick G. Straub.

"Economies Which May Be Effected in Power Transmission," W. W. Nichols.

"Investigation on Tungsten Carbide Cutting Alloys," W. Paul Eddy, Jr.

"Heat Insulation Practice in the Modern Steam Generating Plant," L. B. McMillan.

"Progress Report on Thread Form of Milled Worms," Earle Buckingham.

"Large Spiral Bevel and Hypoid Gears," Allan H. Candee.

"Diamonds as Metal-Cutting Tools," Carl L. Bausch.

"Handling Papers and Small Articles by Pneumatic Tubes," James Whiting.

"Design and Proportions of Economizers and Air Preheaters," Hosea Webster.

"Controlling the Manufacture of Parts on Order and for Stock by the Gantt Progress Chart," David B. Porter.

"Synchronization of Sales and Production," Howard M. Hubbard.

"New Type of Air Spring, J. K. Wood.

"Machine for Making Creep Tests at High Temperatures," G. D. Bagley.

Americans Contribute to Management Congress

Fifteen papers by American authors will be presented at the fourth International Management Congress, which will be held in Paris, June 19 to 23. American participation is being handled by a joint committee representing the American Society of Mechanical Engineers, The Taylor Society, the American Management Association and the Society of Industrial Engineers.

English will be one of the official languages and all papers will be available at the congress in that language. Proceedings will be in six sections: Industry, commerce, agriculture, administration, domestic economy and methods and propaganda. In 1924 the congress was held in Prague, in 1925 in Brussels and in 1927 in Rome.

Steel Furniture Makers Hold Trade Practices Meeting

WASHINGTON, April 16.—The National Association of Steel Furniture Manufacturers, representing 80 per cent of the productive capacity of the steel furniture industry, held a practice conference with Chairman Edgar A. McCulloch of the Federal Trade Commission here last Saturday. Among rules adopted were those governing price discrimination, secret rebates, commercial bribery, interference with contracts, enticement of employees and other objectionable practices.

Fact Book of Structural Steel Industry

A "Fact Book" of the structural steel industry has just been published by the American Institute of Steel Construction, New York. Steel fabricators of the United States, Canada, Mexico and Hawaii are listed and statistics of steel, fabrication and construction work are presented in tables and charts. Data relating to the tallest and largest buildings in the United States and the first comprehensive list of steel bridges in this country are also features of the volume.

The Federal Specifications Board has issued revised specifications for structural steel for bridges (No. 351a); structural steel for buildings (No. 352a); structural steel for cars (No. 373a) and reinforcement concrete bars (No. 350a). These specifications will become mandatory for all departments and independent establishments of the Government not later than June 25.

Metal-Working Machinery, Other Than Machine Tools. Produced in 1927

(Statement of the Bureau of Census)

Number of establishments	62
Wage earners, average for the year (a)	6,125
Wages	$9,957,960
Cost of materials, factory supplies, fuel and purchased power	$10,861,388
Materials and supplies	$10,189,337
Fuel and power	$672,051
Products, aggregate value	$31,748,667
Metal-working machinery, including attachments and parts, total value	$30,044,774
Rod and wire-working machinery	$679,588
Rolling-mill machinery	$7,774,325
Sheet-metal-working machinery	$15,673,062
Wire-drawing machinery	$488,431
Other metal-working machinery	$4,954,056
Attachments and parts	$475,312
Other products and receipts for custom work and repairing	$1,703,893
Value added by manufacture (b)	$20,887,279
Horsepower used in manufacturing	23,078

(a) Not including salaried employees.
(b) Value of products less cost of materials, factory supplies, fuel and purchased power.

PERSONAL

F. L. EBERSOLE has joined the James Criswell Co., steel plant engineer and contractor, Keenan Building, Pittsburgh. For the past six years he has been in the engineering and construction departments, at Pittsburgh, of the Crucible Steel Co. of America, and previously for three years he was with the Central Iron & Steel Co., Harrisburg, Pa., in an engineering capacity.

—

RAYMOND M. SIEVERS has been appointed district sales manager, with headquarters in St. Louis, of Harbison-Walker Refractories Co., Pittsburgh, for the territory from the Mississippi River to the Rocky Mountains. He had been connected with the Evens & Howard Firebrick Co., St. Louis, since 1904.

—

ALAN H. HARRIS, JR., for the past nine years coke oven superintendent, Lackawanna plant of the Bethlehem Steel Co., has resigned to join the sales staff of Koppers Construction Co., Pittsburgh. He was graduated from Stevens Institute of Technology in 1911.

—

CHRISTIAN A. WILLS, recently general shop superintendent, William B. Pollock Co., Youngstown, steel plate fabricator, has been made general manager. He has been with the company for the past 25 years.

—

HAROLD D. SMITH, for many years district representative of the Colonial Steel Co., has resigned to become district representative in the Connecticut territory for the Cyclops Steel Co., Titusville, Pa.

—

E. T. WEIR, president, Weirton Steel Co., Weirton, W. Va., has established a fund providing for four years at the University of Pittsburgh for five Pittsburgh golf caddies. The gift is a memorial to Mr. Weir's brother, the late D. M. Weir, formerly vice-president of the Weirton company.

—

L. E. THOMAS was reelected president of the Reading Iron Co., Reading, Pa., at the annual meeting of directors and stockholders on April 9. R. J. WENGER, who was assistant to the president, was elected a vice-president and he and P. N GUTHRIE, JR., also a vice-president, were elected members of the board of directors. SAMUEL R. SEYFERT resigned from the board, and with the election of Mr. Wenger and Mr. Guthrie the membership of the board was increased from five to six. In addition to the above-named, other officers of the company were reelected. They are JOHN M. CALLEN, vice-president; GEORGE W. DELANY, secretary; HENRY N. YOST, treasurer. Mr. Wenger, the new vice-president, has been with the company 24 years, having started as a messenger boy. The Thomas Iron Co., a subsidiary, reelected officers, who are virtually the same as those of the parent company.

—

GEORGE E. DIX, president, Steel Union Co., Inc., New York, American representative of the Vereinigte Stahlwerke A. G. (United Steel Works Corporation), Düsseldorf, Germany, sailed on the Reliance, April 16, for a two months' business and pleasure trip to Germany, France and England.

—

TYLER W. CARLISLE, vice-president, Strong, Carlisle & Hammond Co., and HERBERT K. OAKES, vice-president, Bethlehem Transportation Co., have been elected directors of the Cleveland Chamber of Commerce for a two-year period and L. R. SCHAFE, general manager, Fisher Body Ohio Co., has been reelected director for one year.

—

GORDON S. MEEK, for 20 years superintendent of the Pennsylvania & Lake Erie Dock Co., Fairport, Ohio, has been appointed superintendent of the Pittsburgh & Conneaut Dock Co., Conneaut, Ohio, and general manager of the Pennsylvania & Lake Erie Dock Co., to succeed the late R. R. Richardson. Mr. Meek has been succeeded at the Fairport dock by H. D. PROSSER, who has been chief clerk and cashier of the Pittsburgh & Lake Erie company at that point. Mr. Meek has been affiliated with the Steel Corporation docks for 31 years.

—

ARTHUR PHILLIPS, assistant professor of metallurgy, Yale University, will speak, April 18, on non-ferrous metals at a meeting of the New Haven chapter of the American Society for Steel Treating, in Hammond Laboratory, Yale University.

—

F. D. CAMPBELL, chief engineer, Eastern Steel Castings, Newark, N. J., will speak on how a local jobbing foundry cut costs, before the Newark Foundrymen's Association, April 24.

—

W. B. HINMAN, president and treasurer, Canadian Metal Products, Ltd., Guelph, Ont., a subsidiary of Steel & Tubes, Inc., Cleveland, has returned home from an extended stay in St. Petersburg, Fla.

—

HOWARD COONLEY, president, Walworth Mfg. Co., addressed the Boston Chapter, National Association of Cost Accountants, on operating aspects of budgetary control, at the Boston Chamber of Commerce, April 11.

—

F. W. PECK, consulting engineer, General Electric Co., West Pittsfield, Mass., last week spoke before the Engineering Society of Western Massachusetts and the Pittsfield section, American Institute of Electrical Engineers, and demonstrated the action of 5,000,000 volts, the greatest voltage ever attained in the laboratory of the General Electric Co.'s Pittsfield plant.

—

I. H. TRUITT has been appointed district sales manager of the Central Alloy Steel Corporation for its Philadelphia district, succeeding C. C. WILLITS, who has resigned. Mr. Truitt was assistant sales manager at Philadelphia and has been connected with the company for several years.

—

L. P. MARSHALL, Standard Electric Time Co., Springfield, Mass., has been made president of the Purchasing Agents' Association of Western Massachusetts, Inc., to succeed EUGENE E. FOOTE, Worthington Pump & Machinery Corporation, Holyoke.

—

HAROLD H. SEAMAN, president, Seaman Body Corporation, Milwaukee, has been elected a member of the board of directors of the Nash Motors Co., Kenosha, Wis., which owns a half interest in the Seaman company and absorbs its entire production, consisting of inclosed bodies.

—

R. K. WEBER has been reelected president of the Mount Vernon Car Mfg. Co., Mount Vernon, Ill. Other officers reelected are H. H. CUST, vice-president, and D. P. SETTLEMIRE, secretary and treasurer.

—

J. H. PORTER, president, Calumet Steel Co., Chicago, returned April 8 from a three months' vacation in Florida.

—

EDWIN J. MOHR has been elected president of the Gould Storage Battery Co., Inc., Depew, N. Y., succeeding KENNETH M. SMITH, who resigned to become connected with Horace E. Dodge Boat Works. Mr. Mohr was formerly production manager of the Gould Coupler Co. and of the Symington Co.

—

S. J. POSEN, president, Ohio Iron & Metal Co., Chicago, sailed, April 17, for a three months' sojourn in Europe.

—

B. H. GILPIN, quality manager, H. H. Franklin Mfg. Co., Syracuse, has resigned to become service manager of the Hartford, Conn., plant of the Pratt & Whitney Aircraft Co. Mr. Gilpin's connection with the automobile and aircraft industries began with the Simplex Automobile Co., Brunswick, N. J., in production, experimental and service divisions and finally as service manager. During the early part of the war the Simplex Automobile Co. was absorbed by the Wright Martin Aircraft Corporation, and Mr. Gilpin then handled inspection activities of the aircraft division. Following the war he was factory

manager of the Remington Typewriter Co. for three years, and during the past four years had been with the Syracuse company.

—

GORHAM C. PARKER, secretary and manager, Stockbridge Screw Co., Stockbridge, Mich., has purchased the Rochester Metal Products Co., Rochester, Mich., maker of automatic screw machine products.

—

RAYMOND WILLEY, formerly in charge of works and operations, and KENNETH SEAVER, formerly general sales manager, have been elected vice-presidents of the Harbison Walker Refractories Co., Pittsburgh. G. G. COOLIDGE, who has been assistant general sales manager, has been named assistant to the president, and W. B. COULLIE, also an assistant sales manager, has been appointed general sales manager.

—

JAMES G. DAVEY was recently appointed sales manager at Philadelphia of the Empire Steel Corporation, succeeding the late W. L. Hoffman. He has been in charge of the finishing department of the company.

—

S. S. RAND has been made vice-president and director of sales of the McCaffrey File Corporation, Philadelphia, to succeed the late Frank Gould. Mr. Rand was previously connected with the Peck, Stow & Wilcox Co., Southington, Conn., and Cleveland, having been for the last seven years that company's sales manager of its small tool and builders' hardware department, with headquarters at Southington.

American Steel & Wire Co. Changes in Personnel

Following the resignation of Henry A. Barren as vice-president in charge of operations, numerous changes have been made in the personnel of the American Steel & Wire Co., effective April 15, as follows:

C. F. Blackmer, who has been superintendent of wire mills, has been appointed general superintendent in charge of operations, his headquarters remaining in Cleveland.

J. C. Hopkins, superintendent of the Central furnaces, Cleveland, has been made general superintendent of blast furnaces and steel works. He has been succeeded as superintendent of the Central furnaces by H. B. Jordan, who has been his assistant.

H. A. Squibbs, who has been sales manager of the fence and post department in Chicago, has been made assistant general manager of sales.

J. B. Clark, general superintendent of the Donora steel works, will retire at his own request May 1 on pension, after 25 years' service with the company and 48 years in the steel business. He will be succeeded by A. F. White, who has been assistant superintendent. W. F. Conlin, superintendent of the open-hearth plant, has been promoted to Mr. White's place.

Pontoon Crane to Lift Canal Lock Gates

Capacity of 500 Tons to Be Employed in Operation of Welland Canal, to Minimize Delays in Service

A LARGE pontoon gate lifter of 500 tons capacity, for handling the lock gates of the Welland ship canal, is being designed by the Wellman-Seaver-Morgan Co., Cleveland, which was given the contract by the Minister of Railways and Canals of Canada. This engineering contract includes design plans, specifications, design computations and estimates of quantities and cost.

There will be four separate hoisting units, each of 125 tons capacity, and each provided with an electric brake. The four hoisting motors will be operated in parallel by a single control and provided with dynamic braking to control accurately the lowering motion.

Canal lock gates which this lifter is to handle are of steel construction, horizontally framed, with sheathing plates on both sides. When the necessary openings in the sheathing plates are closed with the removable covers, each gate leaf will float, flat, upon the water. In this position it will be transported from the storage in the gate yard to any lock where a gate has been damaged and requires replacing.

Upon arrival at the lock the gate-lifting pontoon crane, after first removing the damaged gate leaf, will lift the new leaf from its horizontal floating position into a vertical position and place it upon its pintles. Each gate leaf is provided with four heavy lifting eyes to which the hoisting tackle can be connected for this purpose.

The hull of the pontoon, upon which the gate lifter will be constructed, will have both permanent and movable ballast. The movable ballast (water) will be received in ballast tanks which can be filled or emptied by a motor-driven centrifugal pump, as desired. The gate lifter will be electrically operated throughout, the source of power being a steam-driven generator plant on the pontoon.

The Wellman company has had broad experience in engineering work of this character, having, with but one exception, it is believed, designed and built every large pontoon crane in the United States during the last 30 years, including the 250-ton seagoing crane for the United States Navy, mounted on the ex-battleship Kearsarge. This was described in THE IRON AGE of Feb. 17, 1921, page 443.

OBITUARY

ARTHUR M. SMITH, secretary-treasurer, Gas Machinery Co., Cleveland, died suddenly in New York April 11, aged 49 years. He had been connected with the company since 1901 and was a member of the Cleveland Chamber of Commerce.

—

HARRY T. SIMMONS, for 28 years an engineer in the ore and coal handling machinery division of the Wellman-Seaver-Morgan Co., Cleveland, died April 10, aged 49 years.

—

FRANK GOULD, vice-president, McCaffrey File Corporation, Philadelphia, died on March 29.

—

EVERETT BECKWITH, Western Wheeled Scraper Co., Aurora, Ill., manufacturer of agricultural implements, died recently on his way to Manila, Philippine Islands, aged 65 years.

—

CHARLES PHILIP COLEMAN, engineer, and president Mount Hope Bridge Co., died April 13 at the Mayflower Hotel, Washington, of pneumonia and complications. He was on his way to Hot Springs, Va., for a vacation when he became ill. He was born at Baltimore March 28, 1865. He was graduated from Lehigh University in 1888. In 1913 he became vice-president of the International Steam Pump Co., which was reorganized in 1916 as Worthington Pump & Machinery Corporation. For a time Mr. Coleman was its vice-president and in 1918 became president. Mr. Coleman had virtually retired from active participation in his various enterprises two years ago, when the Mount Hope Bridge Co., then starting construction on the bridge between Bristol and Portsmouth, R. I., made him its president.

—

FRANK B. TOOMBS, general sales manager and treasurer and a member of the board of the Chicago Steel & Wire Co., Chicago, died April 15. He was born at Marquette, Mich., in 1893 and was a graduate of the University of Minnesota. He was one of the organizers in 1914 of the Chicago Steel & Wire Co.

Group life insurance policies have recently been taken out with the Prudential Insurance Co. of America by the American Cast Iron Pipe Co., Birmingham, and the Minneapolis Steel & Machinery Co. and subsidiaries, Minneapolis, Minn. The pipe company's policy insures 1342 lives for $1,728,900, and the Minneapolis company covers 820 lives for $1,136,000.

BOOK REVIEWS

Standards and Specifications

Standards and Standardization. By Norman F. Harriman. 265 pages. 6 x 9 in.; 15 illustrations. Published by McGraw-Hill Book Co., New York. Price, $3.00.

Book of Business Standards. By J. George Frederick. 255 pages. 5 x 7½ in.; Published by the Commercial Standard Council, New York. Price $2.00.

Production and Design. Design and Specifications Affecting Quantity Manufacture of Metal Products. By J. K. Olsen. 212 pages. 6 x 9 in.; 62 illustrations. Published by McGraw-Hill Book Co., New York. Price, $3.00.

Of these three books in the same general field, the first is the best. Once in a blue moon—which is not an exact standard of elapsed time—one comes across a worth while book that seems to have been thought out thoroughly by a competent author, and then written until he was satisfied. Here is one.

Standards of expression in law would prevent many a lawsuit—for instance, a lady meant to leave her fortune to be divided equally among "her children," and said so to her lawyer. But he put "issue of my body"; and the courts decided that that included grandchildren, and caused unpleasantness.

The Better Business Bureaus have done much to reduce confusion and swindles by insisting that such expressions as "part wool" shall be modified by giving the percentages; also by insisting that "Hudson seal," if used, shall be followed by "muskrat" in parentheses.

In the lumber business in this country there is "confusion worse confounded" in nomenclature, owing to the same tree and wood having from two to ten local names; and what makes it worse, having the same name applied to two or more different varieties of trees and woods. In addition, the wood of some trees has a different name from the tree itself (for instance, the linden produces bass wood).

Of course it is too much to expect that an Englishman who has called a certain nut a "monkey nut" at home, shall insist that the New Yorker shall stop saying "pea-nut," the Philadelphian, ground-nut, or the Virginian, "goober." But when it comes to buying and selling such nuts, there should be an international standard.

What would you understand by an order for something "size 2½," where the graduations were on a geometrical scale? Or of a turbine ordered in Valparaiso, Chile, to be made in Springfield, Ohio, "to run with the sun"?

"Standard guarantees" could properly be included in subsequent editions of Mr. Harriman's book. As things are, many written and nearly all oral guarantees are not worth the paper or the breath expressing them. (We even hear, in the antique painting line, of "genuine fakes"—meaning imitations made, say, in Italy, of the local paintings or style that they copy). Such matters are among those taken up by the second book noted. Its reading just now would be most timely, especially in view of the alarming increase in commercial bribery in this country, although the paint and varnish industry seems to have become more alarmed than any other. Recently, the *Typothetæ Bulletin* carried an article on this matter with the apt title "How many purchasing agents have you on the pay-roll?"

Bribery alone, according to Mr. Heydon, chief of personnel for B. Altman & Co., the large New York department store, adds millions of dollars to the cost of distribution, seriously impairs the effectiveness of advertising, prevents efficient purchasing, and penalizes honest salesmanship. Trade custom is evidently no defense for dishonesty or laxness in business standards.

This book may be confidently commended to those who either buy or sell; also to legislators who hesitate to vote for laws fixing business standards and providing definite punishment for infraction of business ethics.

The last book mentioned above deals less with general principles than with concrete examples of how to solve individual problems. Starting with a list of requirements for a good specification for the production of a certain part, the matter is given definiteness by analyzing a good example of such a specification. Special emphasis is given to the dictum that tolerances are necessary for every requirement.

As an instance of how the matter of tolerance in size is handled, the different designations of fits are classified; but the book uses only two names: "press fit," and "running fit." A long quotation from Tentative American Standard Tolerances on the allowances and gages for metal fits is given, together with particular examples of tolerances for various operations, such as knurling, grinding, swedging and stamping.

Data on Enameling Iron and Steel

Enamels. Their Manufacture and Application to Iron and Steel Ware. By Lawrence R. Mernagh. 234 pages, 6 x 8⅝ in.; 19 illustrations. Published by Charles Griffin & Co., London, England.

To apply enamel to ceramic ware, in the true sense of the word, is comparatively easy; gold and silver offer a trifle more resistance to the enameler's skill and experience; but to enamel iron and steel, especially the latter, is a real job. This is entirely independent of the matter of manufacturing the blanks or hollow ware. Fortunately, metallurgists have produced a pure iron free from gas pockets and slag, that behaves well under the press or in the spinning lathe, and takes most enamels well. When it comes to cast iron, the composition of which may vary widely, the enameler is apt to demand of the foundryman more than the latter can or will deliver.

The author takes up all the mechanical and chemical processes of spinning and cleaning the base, preparing and applying the enamel, and firing; and, knowing the many and various difficulties likely to be encountered all along the line, points them out and tells how, if at all, they may be conquered. If not all are conquerable, he relates just what qualities and results are impossible to secure in the same piece, and gives good ideas as to what qualities to choose and which to abandon as unattainable in the present state of the art.

In these days of mass production and constant demand for cheaper product without sacrifice of quality, the steel enameler is confronted at once with the fact that his choice of materials for enamel is limited, by the destructibility, under a heat of 1000 deg., of the beautiful colors available to the dyer and the painter. Other elements that militate against success in this line are the necessity of keeping the enamel mixture exact, and the practice of attempting to keep them secret. Regarding the latter—a "secret scale" is frequently used which enables a workman to mix a batch of eight or nine ingredients in the

correct proportion, without knowing what that proportion is!

In this valuable book of information and reference, Mr. Mernagh takes up the general properties of enamels as such, and of each material that goes into the composition of the frit, as well as their mutual action; shows (what few enamelers know) how to produce a given composition with materials having various percentages of loss in melting; gives elaborate tables of chemical composition as a guide to the enameler who seeks fresh fields; tells how to solve the sometimes difficult problem of de-enameling; and describes the various furnaces and kilns in use and the prices therefor.

Cost Calculations in Iron Foundries

Die Selbstkosten-Rechnung in der Eisengiesserei. By Dr. ing. A. Lischka. 82 pages, 6½ x 9¾ in.; 26 illustrations. Published by R. Oldenbourg, Berlin, Germany. Price, 6.50 marks.

The author commences by saying, what anyone familiar with American foundries will admit applies also here, that there are few branches of industry that oppose the introduction of modern organization and cost calculation, as that of iron founding. He does not state, however, the principal reason, namely, that as scarcely any two foundries are alike, the preparation of a standard cost system, applicable in all its details, would be almost impossible.

Many items of cost have far greater importance in Germany, or may even be absent here; for instance, overtime, wash room, salary during vacations, life, invalid and other compulsory insurance. Herr Lischka makes nice distinction between losses from sink heads, and losses from defectives; but does not consider the difference between shop defectives and customers' returns. Nor does he say whether scrap shall be reckoned at market price of the day or at cost price when bought; nor whether own scrap remelts and overmelts shall or shall not be figured at the same rate as bought scrap. Little or no weight is laid upon depreciation by obsolescence.

Master Specifications of United States Government

Circular 371 of the United States Bureau of Standards gives both an alphabetical index and a numerical list of the Government master specifications as promulgated by the Federal Specifications Board. The list includes 578 items, running alphabetically from abrasive cloth to zinc slabs, and covers a great variety of materials.

Industrial District of Levis

An attractive and well illustrated book of 112 large pages, printed partly in English and partly in French, has been issued by the Chamber of Commerce of the District of Levis, Quebec. It details the development of that district in manufacturing and other lines and the facilities afforded there for shipment abroad. Levis is situated directly across the St. Lawrence River from the city of Quebec, has an active shipbuilding plant and has been growing industrially at a considerable rate.

The standardization of open-competitive specifications for all types of modern buildings and the presentation to architects of complete data essential to the proper description of their drawings are undertaken in a volume recently brought out by Stevens Master Specifications, Inc., Chicago, entitled "Stevens Master Specifications for Architects and Builders." The author, Frank B. Stevens, Jr., is a structural consultant at Chicago, and his purpose is to assist the architect or engineer in avoiding duplication and omission, simplifying contracts, preventing misunderstandings with contractors and abetting the speed and efficiency of construction. The volume contains 608 loose-leaf pages, 8¼ x 10½ in., and is thoroughly indexed. It will be distributed to approximately 10,000 engineers and registered architects throughout the United States.

Riveted Joint Treatise Proposed

A treatise on riveted joints, with an extensively abstracted bibliography on the subject, is promised by the main research committee of the American Society of Mechanical Engineers, if funds to cover the cost of the project can be obtained. A competent engineer has agreed to do this work and has already reviewed some 250 references on the subject. The publication will be a revision and enlargement of the bibliography on riveted joints, published by the society in May, 1924.

Electric Steel Castings Developments

"Developments in Steel Castings" is the title of a booklet recently issued by the Sivyer Steel Casting Co., Milwaukee, which commemorates the twentieth anniversary of the pouring of the first heat by that company on Feb. 23, 1909. It is profusely illustrated with scenes from the foundry as it exists today and in the early days. There are also illustrations of some of the equipment, particularly that used for pouring and testing. Various chapters in the book deal with the stages in the manufacture of electric steel castings from the beginning through to the finished and tested product.

Information concerning a novel method of connecting structural steel shapes is contained in a pamphlet issued by Wesley Wait, Newburgh, N. Y. Tests have been made at Rensselaer Polytechnic Institute on several structural frames built by this method, which is similar to a mortise and tenon joint, reinforced as desired by welding.

New Books Received

The New Industrial Revolution and Wages. By W. Jett Lauck. Pages 308, 5¾ x 8 in. Published by Funk & Wagnalls Co., 354 Fourth Avenue, New York. Price $2.50.

Practical Railway Painting and Lacquering. By H. Hengeveld, C. P. Disney and William J. Miskella. Pages 242, 6¼ x 9¼ in., illustrated. Published by Simmons-Boardman Publishing Co., 30 Church Street, New York. Price, $3.50.

Industrials—Their Securities and Organization. By Sterling H. Bunnell. Pages 334, 6 x 8½ in., illustrated. Published by A. W. Shaw Co., Chicago. Price, $5.

History of Manufactures in the United States. Volume I, 1607-1860, 1929 edition. By Victor S. Clark. Pages 607, 7 x 10 in., illustrated. Published by McGraw-Hill Book Co., 370 Seventh Avenue, New York. Price for 3-volume set, $15.

Journal of the Iron and Steel Institute. 1928, No. 2. Pages 523, 5½ x 8½ in., illustrated. Published by the Iron and Steel Institute, 28 Victoria Street, London, S. W. 1, England.

Machine Tool Builders Cast Doubt on Census Figures

The National Machine Tool Builders' Association has issued a statement which questions the accuracy of the machine tool census figures for 1927, recently announced by the United States Bureau of the Census, and which were published in THE IRON AGE of April 4, page 946.

"After examining these figures," says the National Machine Tool Builders' Association, "we have grave doubts as to their accuracy. Our reasons are that the total figures show larger dollar volumes produced in 1927 than in 1925. This is contrary to our own index of orders, which we have no reason to doubt as to honesty and faithfulness of reports. Our index shows that 1927 was a poorer year for orders than 1925.

"We also have reason to doubt the numbers and dollar volume of some classes of machines reported to the census. Various groups report to us definite group figures of machines ordered, shipped and produced, in both quantity and dollars. All these group reports show the same characteristics that our general barometer figures do; that is, that 1927 was less than 1925. Yet for many classes the census figures show greater numbers produced in 1927 than in 1925. We doubt that any additional production was kept in stock in the industry at the end of 1927.

"As a specific illustration of discrepancy, we find that the total number of engine lathes produced in 1927 reported to the Government was some 1600 more than in 1925. Our engine lathe group reports coming from 12 producers of engine lathes show quite a contrary situation as between the two years. These 12 companies include all but one of the largest producers of lathes. If their reports to us show a contrary situation to that shown on the census returns, we have reason to doubt the Government reports on that item. We have the same reasons to doubt other figures dealing with other types of machines."

The association calls the attention of its members to these seeming discrepancies so that more care may be exercised in the returns for the 1929 census of manufactures.

Plan Wire Rope Research

A cooperative investigation of the properties and use of wire rope to be conducted under the auspices of the main research committee of the American Society of Mechanical Engineers has been urged by representative manufacturers and users of this product.

"There appear to be no well-substantiated facts on which to protect the life of this widely used material or to establish standards for its use," states the society's announcement. "In order that there may be no risk of failure, therefore, thousands of feet of wire rope are discarded each year, long before its useful life is completed. Greater knowledge of the material is apparently needed and would, it is felt, bring about increased use for wire rope as well as greater satisfaction for the user."

The Engineering Foundation and the New York Building Owners and Managers Association are aiding the development of the project, the Engineering Foundation having provided a preliminary review of the present state of knowledge of wire rope and its use. A small committee will be appointed to suggest a program of research, which program will be distributed for comment. Following this, a large and more formal conference of manufacturers and users will be called.

Navy to Open Bids June 5 for Two Cruisers

WASHINGTON, April 16.—The Navy Department will receive bids on June 5 from private shipyards for the construction of two 10,000-ton light cruisers, each requiring 6050 tons of plates and shapes. At the same time it will receive estimates from Navy yards for construction of three cruisers, the naval program calling for the building of each alternate cruiser in the Navy yards, whose total allotment of the program will be eight cruisers; seven will be built in private yards.

The aggregate plate and shape tonnage for the 15 cruisers will be 90,750 tons, while the requirements for the first five will be 30,250 tons, the plate requirements being 4700 tons and the shape requirements 1350 tons for each vessel. Some of the material will be unusually long and wide, the width running as high as 155 in., while the minimum will be 84 in. In its requisition for steel for the three ships to be built in Navy yards, to be made early in July, the Navy Department will divide the steel tonnage into classes according to widths and lengths, so that steel makers may bid on either the entire lot or on each class. Each ship will call for 340 tons of galvanized plates and shapes, and the department will ask for bids on either plain or galvanized material on these lots. In the event it accepts bids on plain material, the contract for galvanizing will be awarded to private interests. It is expected that the private shipyards will make requisition for steel for the two vessels they will build at about the same time the Navy makes its requisition for the tonnage.

Contracts for the second lot of five cruisers will be let before the expiration of the fiscal year ending June 30, 1930, and those for the third and final lot of five cruisers will be made about one year later. It is estimated that it will take about three years to build the vessels after awards have been made, and that the entire construction program will require about six years. The department had originally asked for bids on May 25, but the date was extended to June 5. The limit of cost for the construction of the cruisers is $17,000,000 each, including arms and armament. The program also includes one airplane carrier.

Reelect Officers of Eyesight Conservation Council

Lawrence W. Wallace, Washington, has been reelected president of the Eyesight Conservation Council of America, which is conducting a nation wide movement for better vision in industry. Mr. Wallace is executive secretary of the American Engineering Council, and a past president of the Society of Industrial Engineers.

Other officers for 1929 have been chosen as follows: Vice-president, Bailey B. Burritt, New York; general director, Guy A. Henry, Times Building, New York; and treasurer, William R. Wall, New York. James J. Davis, Secretary of Labor, was named a member of the board of councillors.

Several Engineers Wanted for Government Service

United States Civil Service examinations are announced for mechanical engineers in four grades, with entrance salaries ranging from $2,600 to $5,200 a year, and for chemical engineers in three grades, with entrance salaries ranging from $2,600 to $4,400 a year. Applications must be on file with the Civil Service Commission, Washington, not later than May 14. Full information may be obtained from the commission in Washington or at the post office or custom house in any city.

The United States Civil Service Commission, Washington, will receive applications until May 8 for the position of chief engineer, metallurgical division, Bureau of Mines, Department of Commerce. In view of the importance of the position, the usual form of civil service examination will not be employed, but, instead, the qualifications of candidates will be passed upon by a special board of examiners made up of leaders in engineering research, under the chairmanship of Dr. A. S. Ernest, examiner of the Civil Service Commission. The entrance salary for the position is $5,600 a year.

Clifford J. Dieterle has been appointed receiver of the International Aircraft Corporation, Cincinnati, upon the application of Clarence E. Ogden, treasurer. In his petition Mr. Ogden asserted that the company owns valuable patents and special tools for manufacturing airplanes and airplane parts, and that it has incurred debts approximating $80,000 in the development of its business. The assets, if handled judiciously, will far exceed liabilities if the company is sold as a going concern. Plans are under way for moving the company's plant from Ancor, Ohio, to Jackson, Mich.

Tariff Classification of Sponge Iron

To Group It with Muck Bars Is Claimed Unjustified, Since It Is Crude, Unwrought Metal

CONSIDERABLE difference of opinion is voiced here and there concerning the tariff classification of sponge iron and the duty to be paid upon it. At present Swedish sponge iron is being imported into this country, taking the same duty as pig iron. A suggested change in classification as outlined in THE IRON AGE, March 21, page 825, groups sponge iron with muck bars. It is contended by certain users, as well as prospective makers, of sponge iron in the United States that such a classification is unjustified and would probably also result in a higher railroad freight rate on the material, thereby setting back domestic development work, which has been making rapid progress.

Comments on this subject have been sent to THE IRON AGE by C. H. Thompson, mining engineer, Hollins, Va., who has closely followed the sponge iron development in this country. His opinions are as follows:

In recent years the development of the "new" way of making iron from its ores—by low-temperature instead of high-temperature reduction — has made great forward strides. By low-temperature reduction one gets sponge iron; by high-temperature reduction, pig iron. Imported sponge iron has appeared on the market. It has been passed through the customs at the rate of pig iron and scrap. Its appearance has had a noticeable effect on the interest in domestic production of sponge iron.

Among the questions arising in connection with the possible appearance in larger quantities of sponge iron (from domestic producers) are its proper classification on the railroads and in the customs tariff.

From a technical point of view, sponge iron is naturally "less advanced" than pig iron, as it simply is the iron ore minus its oxygen. It could be called beneficiated iron ore. It is identical in structure and quality with the iron in a blast furnace before the melting zone is reached. It is claimed that steel made from sponge iron as a base is better than steel made from pig iron and scrap. If this be so, then the developments should be encouraged by all authorities, and should enjoy the most favorable rates possible, and naturally not any higher than on pig iron.

It has been suggested to class it with muck bars, but this seems basically incorrect, as muck bars are a beneficiated pig iron, beneficiated in such a way that impurities and carbon are removed by oxidation while puddling. Thus muck bar is a rather advanced product while sponge iron is even less advanced than pig iron.

It would also seem that sponge iron could not possibly be used in crucible furnaces, as it has not been molten and, therefore, necessarily must be somewhat varying in composition in the small lots used in crucibles. In quantities, as used in open-hearth and electric furnaces, the uniformity would be sufficient, and the use of muck bars, except as scrap, in such furnaces is disappearing, due to the high price of muck bars.

It is to be hoped that proper attention is given the true nature of sponge iron technically when this raw material is classified. It is crude, unwrought metal in the truest interpretation of the term.

Consumer Demand for Motor Cars a Good Omen

A higher rate of industrial and trade activity is being maintained in our industrial centers at present than at the same time a year ago, with no indications of any interruption in the immediate future, according to the March report of the Conference of Statisticians in Industry, which operates under the auspices and with the cooperation of the National Industrial Conference Board, New York.

The pace of industrial activity is set by the automobile industry, which in February broke all monthly records. This high output evidently is being absorbed by a strong consumer demand. New car registrations in January were 58.5 per cent higher than in the same month a year ago, 27 per cent higher than in January, 1927, and 4 per cent higher than in the corresponding month of 1926.

New records are reported also for other industries, although they are "not unreasonably high when considered in the face of long-time trends," according to the Conference of Statisticians. The conference points to a continuance of the prevailing business optimism, improvement in the purchasing power of the non-industrial area and stabilization of the money market as requisites to a spreading of the high rate of production and trade activity now prevailing in the industrial centers of the United States.

Residential building construction, alone of the basic industries, shows no improvement, continuing the decline of several months, and the leather tanning industry is operating at relatively low levels. Commodity prices at wholesale, as averaged for February by the United States Bureau of Labor Statistics, declined one-half of 1 per cent from January levels—declines during the month in farm, food and textile prices, and in the prices of hides and leather outbalancing increases in the price of metals and metal products, of building materials, of chemicals and of drugs. The unsettled credit situation continues to be the outstanding factor of uncertainty as to the immediate future.

Employment 8.71 Per Cent Ahead of Last Year

According to the annual spring employment survey of the National Association of Manufacturers, industrial employment is 8.71 per cent higher than it was a year ago. Returns from 1007 companies, employing from five to 24,961 people, showed an average of 561, against 516 for the same companies last year. The industries reporting are operating at the average rate of 85.1 per cent of capacity.

Of the total number, 558 report a gain in employees, 161 indicate no change and 288 show a falling off. Of the 23 industries surveyed, 19 reported gains and four reported losses.

According to industries, the five largest gains are in the metal-working field, including 44 per cent for automobile accessories, 23 per cent for automobiles, 14 per cent for machinery, 13.5 per cent for electrical goods and 10.5 per cent for iron and steel. Further down the list are non-ferrous metals, with 5 per cent, and hardware, with 4 per cent more than last year.

PRODUCTION OF BLAST FURNACES IN THE UNITED STATES IN 1927 AND 1925

(*From Census of Manufactures for* 1927)

	1927	1925	Per Cent of Increase (+) or Decrease (—)
Number of establishments	116	122	—4.9
Wage earners, average for the year (a)	27,958	29,188	—4.2
Wages	$44,258,499	$45,312,168	—2.3
Cost of materials, furnace supplies, fuel and purchased power	$579,555,036	$617,416,880	—6.1
Materials and supplies	$381,622,775	(b)	...
Fuel and power	$197,932,261	(b)	...
Products, total value	$708,904,238	$765,286,229	—7.4
Blast furnace products	$706,447,979	$763,425,097	—7.5
Other products, value and receipts for custom work	$2,456,259	$1,861,132	+32.0
Value added by manufacture (c)	$129,349,202	$147,869,349	—12.5
Horsepower used	1,546,993	1,380,394	+12.1

[No data are included here for establishments producing ferroalloys by the electric-furnace process, nor for establishments in other industries which made ferroalloys as secondary products.]

(a) Not including salaried employees.
(b) Not reported separately.
(c) Value of products less cost of materials, furnace supplies, fuel and purchased power.

General Electric's $7,500,000 Wage Bonus

Plan Embraces All Wage Earners With Five or More Years' Service, as Well as Salaried Men

GERARD SWOPE, president General Electric Co., in his annual report to stockholders, outlined the plans in effect for paying employees by results rather than by time clock. He characterized it as a "method employed to encourage the greatest effective productivity from all classes of employees."

Continuing, Mr. Swope said: "The simplest method of wage payment is to pay for time. In many respects this method is unsatisfactory, principally because in itself it offers no incentive to do a better job nor does it reward the efforts of the ambitious worker, but in many cases it is the only system that has so far been devised.

"Perhaps the earliest incentive wage plan is the direct piece-rate plan under which payment is based upon the number of pieces produced. This is often satisfactory when the product can be standardized and put in quantity production with no changes in methods.

"Modifications of the piece-rate system have been introduced, such as the differential piece-rate, task and bonus, group incentive and many others.

"Earnings of General Electric workers are studied to identify those who are making the highest earnings and to retain them and give them greater opportunities either for earning more or for promotion to supervisory work, as the company's interest lies in obtaining the best and most highly skilled workmen and supervisors.

"Employees long in the service of the company have acquired experience and greater skill and consequently have more value. There is also less chance of their leaving, with a resulting decrease in labor turnover and a substantial saving of expense. Because of this, all employees not in higher salaried positions, with five or more years service, are paid supplementary compensation of 5 per cent of their annual earnings. This payment is made semi-annually in cash, or in bonds of the General Electric Employees' Securities Corporation, at the option of the employees.

"Studies are being made to determine if the supplementary compensation for continuous service can be made dependent upon the profits of the company, to which all employees contribute.

"Employees in important and supervisory positions in all departments, including administrative, engineering, manufacturing and sales, are formed into groups having a common interest in and responsibility for the results attained by a department, a sales district, a factory or other subdivision of the business. The elements of the responsibility of each group are defined and used as a basis for determining the efficiency of its operation. Periodical reports are prepared showing the progress of each group and at the end of the year an extra compensation fund for each group is calculated upon the results. These plans embrace all branches of the organization, including the leading executives. The plans for this last group are based upon the net profit of a department or of the company, after provision for all expenses, including taxes and a reasonable return on the investment.

"As soon as possible after the end of the year the extra compensation earned is paid to the participants according to their ratings, in cash, in bonds of the General Electric Employees' Securities Corporation, or in common stock of the General Electric Co. purchased in the open market.

"The grand total of all supplementary and extra compensation paid for the year 1928 to 40,040 employees amounted to $7,431,137."

To Study Machine Efficiency and Obsolescence

A study of machinery used in the wood-turning branch of the woodworking industry has been undertaken by the Domestic Commerce Division, Department of Commerce. The survey was begun at the request of the National Association of Wood Turners, Inc., and the Association of Manufacturers of Wood-Working Machinery. The purpose is to determine the extent to which the more profitable machines are being used, by showing how many machines are still used that are extravagant as compared with some other machine which could perform the same work under similar circumstances.

The study will include data on such points as will measure the profitableness of given types of machines of various ages under the same conditions, and so determine the unnecessary expense involved in continuing to use machines which may be considered uneconomical, due to some improvement that lowers production costs on that type of work.

It is contemplated also to secure data on the number of machines originally installed in the expansion of the plant, and those that replaced other machines of the same kind. If a replacement is involved, it will be ascertained whether each displacement was because the old machine was inadequate, extravagant or worn out. From these facts it is hoped to deduce some measure of the economic life of a machine, and the two factors on which it depends, depreciation and obsolescence.

Larger Output of Trackwork

March shipments of trackwork for T-rail track of 60 lb. and heavier are reported by the American Iron and Steel Institute at 14,927 net tons. This is the largest monthly figure since March, 1928, when 15,058 tons was shipped. The total for the first quarter was 37,451 tons, which is the largest first quarter's total since 1927, when 45,863 tons was shipped, and the largest quarterly figure since the second period in 1928, when 41,368 tons was shipped. It was lower, however, than any quarter in 1926 and lower than any except the last quarter of 1927.

Plans are being made for observance this year of Light's Golden Jubilee, marking the fiftieth anniversary of Thomas A. Edison's invention of the first practical incandescent lamp. A committee has been formed to plan and direct the events and activities of the jubilee, and headquarters have been established at 2650 Graybar Building, 420 Lexington Avenue, New York.

STEEL-WORKS AND ROLLING-MILL PRODUCTS

Summary for the Industry (a)

	1927	1925	Per Cent of Increase (+) or Decrease (—)
Number of establishments	486	473	+2.7
Wage earners (average for the year) (b)	361,312	370,726	—2.5
Wages	$601,275,499	$614,984,982	—2.2
Cost of materials, mill supplies, fuel and purchased power	$1,689,655,295	$1,811,961,218	—6.7
Products, total value	$2,779,840,238	$2,946,068,231	—5.6
Steel-works and rolling-mill products	$2,776,389,255	$2,940,344,764	—5.6
Other products and receipts for custom work and repairing	$3,450,983	$5,723,467	(c)
Value added by manufacture (d)	$1,090,184,943	$1,134,107,013	—3.9
Horsepower used	5,234,065	4,763,533	+9.9

(a) From the 1927 Census of Manufactures.
(b) Not including salaried employees.
(c) Figure for 1925 is not strictly comparable with that for 1927, as it includes value of cinder and scale not reported in detail.
(d) Value of products less cost of materials, mill supplies, fuel and purchased power.

Consumer Demand Decrease Near

(*Concluded from page* 1087)

Nevertheless, there appears to be no prospect of such an increase in equipment buying as occurred in 1922-1923. At that time a deficit of freight cars existed, while now there is a surplus, which, though less than a year ago, is well up to the average of the years since 1922. This surplus, too, appears to have increased in March, and March car loadings made a less than seasonal gain.

Unusually High Rate of Steel Production

STEEL production increased more than usual in March and reached the highest rate since 1923, after allowing for normal growth and for the merely seasonal changes from month to month. Our adjusted index is 119.9 per cent of normal. It represents an ingot output that is about 40 per cent above the low level reached in November, 1927.

At the same time, unfilled steel orders also increased more than usual and, for the first time since February last year, were a little above the monthly average for the years 1923-1927. It is to be remembered, however, that the seasonal peak of unfilled orders is reached in the first quarter, and, allowing for this fact, we find the adjusted index to be only 97.7 per cent of the average for 1923-1927.

After all, the Steel Corporation's unfilled orders at the end of March were only 13,000 tons above the figure for February last year. But it remains true that the March gain in unfilled orders was rather impressive, because it was contrary to the usual seasonal trend for the month and because of the heavy production and shipments that accompanied it.

The recent trend of unfilled orders is a clear indication of a tendency toward forward buying, and is in conformity with the usual developments in the latter part of a business cycle. Reports of some difficulties with deliveries and the more extended coverage by buyers are suggestive of the danger.

Pig iron production in March was at a rate of 17.7 per cent above estimated normal. This represents a small decline from February, but compares with a rate only 2 per cent above normal in March, 1928. Allowing for normal growth and for seasonal variation, the pig iron output of the last two months has not been exceeded since early 1925. It does not seem to be excessive in comparison with steel production, however, for the average daily output of pig iron has actually decreased relatively to the average daily output of steel. It therefore seems probable that pig iron production will hold close to present levels for another month or two. In fact, precedent indicates that the output will not decline materially until a decline in prices occurs.

Finished Steel Prices May Hold Firm

AS to the price situation, we find finished steel prices gradually creeping upward, THE IRON AGE composite for March being 2.395c. a lb., in comparison with 2.391c. in February and 2.361c. a year ago. Pig iron price averages have been almost unchanged, the March figure being $18.36 as against $18.38 in the previous month. This compares with $17.72 in March, 1928.

One notable fact, illustrated in the fourth chart, is that the general level of commodity prices has shown a downward drift and is the lowest since the middle of 1927, while finished steel prices have gradually worked a little higher and are the highest since early 1927. The result is that the finished steel average is above its recent relation with the general level of commodity prices.

This is a condition which usually exists within a few months of the peak of a business cycle. Judging both by precedent and by the present activity of demand, however, steel prices will at least hold firm for several months.

Pig iron is still relatively cheap, while steel scrap is relatively dear. Scrap is higher in comparison with pig iron than it has been in many years. Scrap prices in January were plainly too high, and the subsequent reaction has brought them down to a point where heavy melting scrap at Pittsburgh about equals THE IRON AGE pig iron composite.

All experience, however, indicates that this condition cannot last long, and it is only a question of time before further declines occur in the scrap market. Pig iron markets convey an impression of firmness and the possibility of further advances is indicated, but with equal clearness it is indicated that such advances will not continue long and will be followed by a reaction.

Large Building Construction in March

New contracts for building and engineering work in March in the 37 States east of the Rocky Mountains are reported by F. W. Dodge Corporation at $484,847,500. This represents an increase of 34 per cent over the February amount, but shows a drop of 18 per cent from the figures for March, 1928. Residential construction continues to hold more than 40 per cent of the total, with a March aggregate of $197,172,000. Commercial buildings called for $75,584,000; public works and utilities for $71,508,000; industrial projects for $55,837,000.

For the first quarter of the year contracts have aggregated $1,256,089,000, a reduction of 15 per cent from the total for the first quarter of 1928, which was $1,485,067,000. New contemplated projects reported during March aggregated $886,075,000. This was an increase of about $2,000,000 over the corresponding figure for a year ago, and was 15 per cent above the amount reported in February.

Less Portland Cement Being Made

Production and shipments of Portland cement are falling behind last year, marking the first such decline in this commodity in the first quarter of any year since 1921. Lessening building and engineering construction operations are held accountable for the drop.

Figures of the United States Bureau of Mines show 9,969,000 bbl. made in March and 28,372,000 bbl. in the quarter, against 10,223,000 bbl. and 28,788,000 bbl. last year. Shipments were 10,113,000 bbl. in March and 21,268,000 bbl. for the quarter, in comparison with 10,135,000 bbl. and 23,239,000 bbl. last year.

Stocks of finished cement at end of March, 29,727,000 bbl., while slightly lower than on Feb. 28, were otherwise the highest on record. The maximum last year was 27,627,000 bbl., on April 30. Employment in the industry is reported to be 1 per cent below last year.

Schedule of the next instalments of the ***Business Analysis and Forecast****, by Dr. Lewis H. Haney, Director, New York University Bureau of Business Research, follows:* ***May 2****—Activity in Steel Consuming Industries;* ***May 16****—Position of Iron and Steel Producers.*

Cartels Again Loom Large in Europe

Actively Discussed from Various Angles—France Needs More Steel Workers—British Prices Remain Firm

(*By Cable*)

LONDON, ENGLAND, April 15.

AUSTIN FRIARS TRUST, which arranged the formation of the Allied Iron Founders, Ltd., controlling Scottish light castings makers, has now offered to purchase all the securities of the United Steel Companies, Ltd., and the preferred stock of the United Strip & Bar Mills, Ltd. This seems to indicate a serious effort to reorganize the entire British heavy steel industry, which probably represents a total capital of about £250,000,000.

It is believed that the time is opportune for a complete reorganization with powerful financial assistance.

It is also believed that negotiations have been quietly initiated for the participation of British works in the International Steel Cartel, provided the cartel is renewed for five years at the June meeting. Many British mills would doubtless welcome inclusion in the cartel.

A plan has been proposed for the sale of Darwins, Ltd., of Sheffield, now liquidating, to a new company of the same name, with a capital of £730,000.

Export of fuel has declined, resulting in lower coke prices, so that pig iron producers are considering blowing in additional furnaces. Meanwhile, pig iron prices are tending upward with Cleveland makers sold out until July.

The Cleveland minimum prices are unchanged, but sellers are not accepting less than 1s. 6d. (36c.) over the minimum quotation.

Hematite iron is quieter, but furnaces are well booked for the next few months. Tees shipments last week included 2000 tons of ferromanganese to the United States and 2000 tons of spiegeleisen to Canada.

Finished steel prices are firm, but domestic demand is quieter and export interest is increasing. Steel makers are meeting this week and an advance in prices is expected.

March export of pig iron was 37,700 tons, of which the United States received 2500 tons. Total export of iron and steel was 350,000 tons.

Tin plate is strong, with both domestic and export markets active. Makers are well sold ahead. American tin plate mills exceeded their export quota under the Welsh-American agreement by some thousands of tons, but will rectify this during the next few months.

Galvanized sheets are quiet. Black sheet inquiry from the Far East is slack, but small business is being booked from other markets.

Continental semi-finished steel prices are strong and 2-in. billets have sold at £5 8s. ($26.19) per ton, f.o.b. Sheet bars are quoted at £5 8s. 6d. ($26.31) per ton, f.o.b. Business here is quiet as these prices are considered too high and only extended deliveries are offered.

The international tube makers have formed a cartel as a result of the London meetings. The agreement can be terminated by early 1930. No other details have been disclosed. The German Locomotive Builders Export Cartel is reported to have been dissolved because of dissension over business from the Near East.

German, French and Belgian light castings makers contemplate forming a cartel to control stoves, baths and similar products and will approach the newly formed Scottish light castings company to participate.

Renewal of Cartels Discussed

Dissolution of German Syndicates Would Foreshadow Withdrawal From International Cartel

BERLIN, GERMANY, March 30.—The dissolution of certain domestic steel syndicates is urged by some interests, and, if their views prevail, German withdrawal from the corresponding international cartels will be necessary. Such important producers as Gutehoffnungshütte at Oberhausen, the

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works with American equivalent figured at $4.85 per £ as follows:

Durham coke, del'd	£0 19s.	to £0 19½s.	$4.60 to $4.72
Bilbao Rubio ore*	1 3		6.18
Cleveland No. 1 foundry	3 11		17.21
Cleveland No. 3 foundry	3 8½		16.61
Cleveland No. 4 foundry	3 7½		16.37
Cleveland No. 4 forge	3 7		16.25
Cleveland basic (nom.)	3 7½		16.37
East Coast mixed	3 14		17.94
East Coast hematite	3 14½		18.06
Rails, 60 lb. and up	7 15	to 8 15	37.59 to 42.43
Billets	6 5	to 6 7	30.31 to 30.79
Ferromanganese	13 15		66.69
Ferromanganese (export)	13 10	to 14 0	65.47 to 67.90
Sheet and tin plate bars, Welsh	6 6¼		30.61
Tin plate, base box	0 18⅓	to 0 18¾	4.45 to 4.53
Black sheets, Japanese specifications	13 10		65.47
			C. per Lb.
Ship plates	7 12½	to 8 2½	1.66 to 1.76
Boiler plates	9 0	to 10 10	1.95 to 2.27
Tees	8 2½	to 8 12½	1.76 to 1.86
Channels	7 7½	to 7 17½	1.60 to 1.71
Beams	7 2½	to 7 12½	1.55 to 1.65
Round bars, ¾ to 3 in.	7 15	to 8 5	1.67 to 1.78
Steel hoops	9 0	to 10 0	1.95 to 2.16
Black sheets, 24 gage	10 0		2.16
Galv. sheets, 24 gage	13 7½	to 13 10	2.90 to 2.92
Cold rolled steel strip, 20 gage (nom.)	12 0		2.64

*Ex-ship, Tees, nominal.
(a) Nominal.

Continental Prices All F.O.B. Channel Ports

(Per Metric Ton)

Foundry pig iron (a):			
Belgium	£3 8s.	to £3 10s.	$16.49 to $16.97
France	3 8	to 3 10	16.49 to 16.97
Luxemburg	3 8	to 3 10	16.49 to 16.97
Basic pig iron (a):			
Belgium	3 6		16.00
France	3 6		16.00
Luxemburg	3 6		16.00
Coke	0 18		4.37
Billets:			
Belgium	5 8		26.19
France	5 8		26.19
Merchant bars:			C. per Lb.
Belgium	6 3	to 6 4	1.34 to 1.35
France	6 3	to 6 4	1.34 to 1.35
Luxemburg	6 3	to 6 4	1.34 to 1.35
Joists (beams):			
Belgium	5 4	to 5 5	1.14 to 1.15
France	5 4	to 5 5	1.14 to 1.15
Luxemburg	5 4	to 5 5	1.14 to 1.15
Angles:			
Belgium	6 0	to 6 2	1.31 to 1.32
¼-in. plate:			
Belgium (a)	6 6	to 6 6½	1.38 to 1.40
Germany (a)	6 6	to 6 6½	1.38 to 1.40
5/16-in. ship plate:			
Belgium	6 5½		1.37
Luxemburg	6 5½		1.37
Sheets, heavy:			
Belgium	6 1		1.31
Germany	6 1		1.31

Hoesch Iron & Steel Co. and the Vereinigte Stahlwerke A. G. have expressed doubt that some of the present domestic agreements can be continued.

In the event that the domestic "A" Products Syndicate, which includes rails in the products it controls, is not renewed Germany is free to withdraw from the European Rail Makers' Association. Likewise, German membership in the International Steel Cartel is dependent upon continuation of the domestic Raw Steel Syndicate. The agreement for the latter expires Oct. 31, 1929, simultaneously with the International Steel Cartel, and the "A" Products Syndicate, which controls semi-finished material, structural steel and rails, expires in the spring of 1930.

Preponderance of Opinion in Favor of Cartels

Although there have been adverse statements from certain large steel producers of Germany, the preponderance of opinion in the steel industry appears to be for a retention of the syndicates, which have aided materially in maintaining domestic prices by reducing competition. Prices of bars, for example, have fluctuated very little since formation of the syndicate in 1925, although prior to the war and from the Armistice to 1924 they varied as much as 25 per cent. Other products controlled by syndicates have been affected in a similar manner.

Domestic syndicates are much more inclusive than prior to the war, when only a part of the steel industry was organized. Between 1925 and 1926, practically all steel products except thin sheets were syndicated. Efforts to organize the mills rolling thin-gage sheets were made for many years prior to the war, but they failed because of the wide variety of thin sheets produced.

During the period when most of the syndicates were organized (1925 and 1926), the steel industry was depressed as a result of post-war depression, currency inflation and the Ruhr occupation, and combination was regarded as a necessity. Today, however, the steel industry is in a prosperous condition and certain large producers evidently feel strong enough to dispense with the cartel.

Mills Seeking Larger Quotas

The chief question to be settled in renewing the domestic syndicates will be the revision of quotas. Many companies have suffered considerable losses from the unprofitable prices received for export, and are demanding separate allotments for domestic and foreign trade. New quotas will probably be fixed for most of the present syndicates before they are renewed. Since 1927, demand for semi-finished steel in the open market has decreased, with more companies producing their own requirements, and business in railroad permanent way material has diminished. In tubes and wire rods, however, demand has increased. On the basis that a considerably larger demand for steel products will develop either this year or in 1930, many mills are seeking larger quotas to permit operation of additional capacity constructed since the formation of the syndicates of which they are members.

Tube Cartel May Dissolve

Perhaps the chief threat to a domestic and international cartel is in tubes. Only informal discussions have been held by the German Tube Syndicate and the Friedrich Krupp A. G. on the proposed construction by the latter of a tube mill that would add about 25 per cent to the German production. Under the agreement, the syndicate is automatically dissolved when the production of a non-member exceeds a stipulated tonnage. The dissolution of the tube cartel would have an adverse effect on negotiations for the renewal of other syndicates, and would indirectly affect the International Steel Cartel.

The International Steel Cartel agreement required members intending to withdraw to notify the cartel on or before April 1. No such notice was given, but at the last meeting it was agreed that the cartel would automatically expire unless notice of renewal were given before the date of expiration Oct. 31. Continuance of the cartel agreement, therefore, hinges on the result of negotiations in the next few months.

France Has Labor Shortage

Steel Industry Seeking Return of Foreign Workers —Sellers Seek to Increase Home Consumption

BORDEAUX, FRANCE, April 1.—Shortage of skilled labor and a decline in the volume of exports are problems faced by the French iron and steel industry. The labor shortage is becoming more acute, although both Germany and Great Britain have about 1,000,000 unemployed. France, however, is primarily an agricultural country and the steel industry, although important, occupies a position of secondary importance. Whatever the cause, employers of skilled labor are competing for the services of the skilled workmen available, offering increased wages and in some cases free living quarters and medical attendance.

About two years ago the Government, under pressure from the Socialist and Labor parties, caused a large number of foreign workmen to leave France by creating difficulties in the renewal of their Cartes d'Identite, letting it be understood that their absence was preferred to their continued presence in France. At that time, with the exchange value of the franc at a low level and about 3,000,000 foreign workmen in France, fear was expressed that competition would be too great in the labor market. Efforts are now being made to rectify this error and skilled foreign workmen will be invited to return.

While French production of iron and steel is increasing, exports showed a considerable decline last year. This recession has caused some alarm, in view of a possible decline from the present high level of domestic demand. Domestic requirements in 1927 absorbed 47 per cent of the ingot production, and in 1928, 60 per cent.

It is suggested in some quarters that, as the consumption of iron and steel in France is only about 150 kg. per capita, compared with 310 kg. per capita in Belgium and about 410 kg. per capita in the United States, there is ample scope for further increases in domestic consumption. The fact that France is primarily an agricultural country renders it difficult to estimate the per capita gain that can be counted on. However, those urging greater cultivation of domestic markets assert that French foreign trade is endangered by impending tariff legislation in England and the United States and by greater pressure for export business on the part of Germany and other European countries.

British Granted Better Terms in Rail Cartel

BERLIN, GERMANY, March 30.—At the recent meeting of the European Rail Makers' Association, the British were granted more favorable terms. While British sales to the dominions and mandate territories will continue to be included in the cartel quota, rail business with British India and the Crown colonies will be considered as British domestic sales and not subject to the quota.

The excess of 120,000 tons of rails shipped by the British beyond their quota will be subject to the terms of the former agreement, incurring a penalty of 7s. 6d. to 12s. 6d. ($1.82 to $3.03) per ton, but under the new agreement excess shipments up to 37,500 tons will be fined 10s. ($2.42) per ton and more than this maximum will be subject to a penalty of £1 ($4.85) per ton.

Under the revised agreement, Germany's deliveries of rails on reparations, if not in excess of a total of 275,000 tons, will not be included in its quota.

German Market Is Active Following Severe Weather

BERLIN, GERMANY, March 30.—The activity of the Continental pig iron market is largely a result of the severe winter, which hampered transportation of pig iron and of ore and coke. A shortage of pig iron is reflected in an advance in prices by the Western pig iron entente on exports to Switzerland, Italy and Holland, but for the current month the German Pig Iron Syndicate has made no change in its quotations to domestic consumers.

Domestic demand for ship plates is increasing, and export trade is active in semi-finished and certain rolled products. Production generally is being maintained at a fairly high level, despite the slackness in the building trades and other consuming industries because of the recent severe weather.

According to unconfirmed reports, German manufacturers will receive some sizable contracts from the South Manchuria Railroad Co. for its proposed steel plant and rolling mills at Anzan, Manchuria. The total cost of the project will be 16,000,000 to 18,000,000 m. ($3,808,000 to $4,284,000), and orders are about to be placed, it is said, with the Krupp Gruson works at Magdeburg, Krupp Friedrich-Alfred-Hütte at Rheinhausen and the Demag works at Duisburg.

Sharp Rise of Japan's Steel Output Traced in Bulletin

WASHINGTON, April 16.—The rapid growth of the Japanese iron and steel industry is described with considerable detail in Trade Information Bulletin No. 612, just issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce. Copies of the bulletin are available at 10c. from the Government Printing Office, Washington. Entitled "Production of Iron and Steel In Japan," the bulletin was prepared by J. Joseph W. Palmer from a series of reports on the Japanese industry, transmitted to the bureau by Assistant Commercial Attaché J. H. Ehlers, Tokio. This is the second of a series of three. The first, Bulletin No. 573, "Raw Materials Entering Into the Japanese Iron and Steel Industry," was published in October, 1928, and the third bulletin, "Japanese Trade in Iron and Steel Products," will appear shortly.

In the past 15 years the annual production of crude steel in Japan has increased from 255,000 metric tons to 1,680,000 tons (1928), while pig iron output has increased from 239,169 tons to about 1,380,000 tons. Production of finished products has shown a corresponding growth in this period. "This development, a truly remarkable performance in view of the many factors tending to restrict it, could scarcely have taken place except under the peculiar economic system prevailing in Japan, a system under which the Government is in a position to foster the expansion of industries despite natural or economic disadvantages," the bulletin points out.

"The profits returned by the industry have scarcely been such as to warrant the expansion which has taken place over the last eight years; yet over this period production has been virtually doubled, figures for 1920 indicating an output of 804,133 tons of steel ingots, compared with an estimated output of 1,680,000 tons in 1928. Existing equipment has been enlarged to a considerable extent, in the belief that the natural obstacles present can be overcome and that the local industry will continue to receive Government support and protection."

American Mills Reported in Tube Syndicate

NEW YORK, April 16.—According to recent reports published in Germany and France and cabled to importers of steel in New York, American tube mills will join the International Tube Syndicate and will formally sign the agreement for membership at a meeting some time this month. New York importers of European tubes believe that American membership in the syndicate will result in a restriction on exports to the United States of tubes ranging up to 14-in.

The suit of American steel mills against importers, which brings into dispute the interpretation of the regulations on marking steel with the name of the country of origin, is scheduled for April 17, in the Customs Court, New York. The test case selected for trial covers importations of bars, small shapes, structural material and bands by Winter, Wolff & Co., 225 Broadway, New York. A number of importers in New York are contributing to the defense, as the decision will affect all importers alike.

Export business to the Far East has been small lately, but some sizable contracts for steel mill equipment to be shipped to the new plant of the South Manchuria Railroad Co. at Anzan, Manchuria, are pendng. An engineer of the railroad has been visiting European manufacturers of steel mill equipment and is expected to arrive in the United States about the end of this month. The projected plant will cost several million dollars.

Germans Erect Building of Rustless Iron

ERECTING a building of rustless iron is one of the novel developments in Germany, according to the information furnished with the accompanying illustration. It was erected in Essen, Germany, and is a product of the Krupp Works.

Brazil Buying Much More Steel Wire

In the first 11 months of 1928, imports of barbed wire into Brazil totaled 43,729 metric tons, against 38,613 tons for the entire year 1927, according to a report received from Vice-Consul J. F. Burt, Rio de Janeiro. Belgium was the principal supplier. Imports from the United States during the 12 months of 1928 were 16,790 gross tons, against 9109 tons in 1927.

Imports of wire other than barbed wire during the 11 months of last year were 32,089 tons, against 27,059 tons during the entire year 1927. Germany and Belgium led by far as sources of these shipments. United States export statistics indicate that shipments to Brazil of plain black and galvanized wire, woven wire fencing and wire cloth and screening increased to 1498 tons in 1928, compared with 1074 tons in 1927.

Industrial Machinery Going to Poland

American machinery is well known in Poland, and imports from the United States rose to $1,150,000 in 1927, against $256,000 in 1926, according to a report received by the Department of Commerce from Assistant Trade Commissioner Gilbert Redfern, Warsaw. Mr. Redfern declared that there is a distinct preference in Poland for trade with the United States and keen appreciation of the quality and efficiency of American equipment.

Germany leads as the source of Polish industrial machinery imports, however, providing more than 50 per cent of the total. The dominating position of Germany is attributed to long-term credit conditions, ranging up to three years, and advantageous prices.

Machinery Markets and News of the Works

Tool Sales Fall Off Slightly

Orders So Far in April Below March Rate and That in Turn Showed a Loss Compared With February

MACHINE tool orders, commonly regarded as an index of general business conditions, have fallen off slightly this month, and they also fell off in March, as compared with February, according to the monthly report of the National Machine Tool Builders' Association.

Although the actual orders for March were less than for February, the three-months' average of January, February and March was 20 points higher than the February figure, owing to the fact that March orders were larger than those of December, which was included in the previous three-months' average. The decrease in net orders in March was accompanied by an increase in shipments, so that now machine tool builders have, on the average, a 60-day backlog, whereas the average was about 80 days at the end of January and 70 days at the end of February. That the industry has considerably increased its output is indicated by the fact that March shipments were the highest since the National Machine Tool Builders' Association began collecting such monthly information.

Notwithstanding the decline in orders, business is at a substantial level this month, and prospects for a continuance of a good demand are favorable.

One of the largest railroad lists issued in some time has been sent out by the Delaware, Lackawanna & Western, which is taking bids this week on 37 items.

New York

NEW YORK, April 16.—The Delaware, Lackawanna & Western Railroad is receiving bids this week on one of the largest railroad lists of machine tools issued in the East in some time. The list totals 37 items, many of which are heavy-duty machines. Although machine tool buying is still at a high rate, some sellers in this market predict that April totals may fall a little short of those of March.

The inquiry of the Delaware, Lackawanna & Western lists the following tools:

One 30-in. x 14-ft. engine lathe.
One 20-in. x 14-ft. engine lathe.
One 18-in. x 10-ft. geared-head engine lathe.
One 54-in. x 30-in. x 16-ft. horizontal spindle milling machine.
One 90-in. quartering machine for crank pins.
One 54-in. vertical turret lathe.
Two 48-in. heavy-duty radial drilling machines.
One 66-in. inclined, hydraulic forcing press, 400 tons capacity.
One universal turret lathe, 20-in. swing.
Two 14-in. bolt lathes, 6-ft. bed, 30 in. between centers.
One 42-in. vertical turret lathe.
One 72-in. plain radial drilling machine.
One plain horizontal milling machine.
One heavy-duty, portable, cylinder joint facing machine.
One 2-in. double-head bolt threading machine.
One 3⅛-in. x 36-in. hollow hexagon turret lathe.
One 14-in. ball-bearing sensitive drilling machine.
One 1¼-in. full automatic turret lathe.
Two 2A universal hollow hexagon turret lathes.
One floor grinder, 16-in. diameter x 2½-in. face grinding wheels.
One internal grinder, type FG.
Two turret lathes, 18-in. swing, 6-ft. bed.
One 24-in. vertical drill press.
One No. 2 Geist roller pipe cutter.
One bolt pointing machine.
One 1¼-in. high-duty heading, upsetting and forging machine.
One 2-in. high-duty heading, upsetting and forging machine.
One heavy-duty production lathe for axles; 13-in. swing and 96 in. between centers.
One double-end hot saw and burring machine.
One combination wet and dry grinder.
One 32-in. heavy-duty, back-geared crank shaper.
One 2A universal hollow hexagon turret lathe.
One 60-in. plain radial drilling machine.

Segal Lock & Hardware Co., 155 Leonard Street, New York, has plans for one-story addition to plant at 55 Ferris Street, Brooklyn, to be equipped largely as foundry, to cost over $50,000. Lockwood Greene Engineers, Inc., 100 East Forty-second Street, New York, is architect and engineer.

Adolph Marchand, 680 Fifth Avenue, New York, manufacturer of lighting fixtures, has leased space in building at 208 Rawson Street, Long Island City, for new plant.

New York Power & Light Corporation, and Mohawk-Hudson Power Corporation, parent organization, 126 State Street, Albany, N. Y., have plans by Parsons, Klapp, Brinkerhoff & Douglas, 84 Pine Street, New York, engineers, for hydro-electric generating plant at Conklinsville, N. Y., to cost over $750,000 with transmission lines.

P. Gregory Stadler, 1227 Thieriot Avenue, New York, architect, will soon begin superstructure for four-story automobile service, repair and garage building at Eastchester, N. Y., to cost more than $100,000 with equipment.

American Gear Co., Inc., 944 Atlantic Avenue, Brooklyn, has purchased property at 972 Atlantic Avenue, and will remodel for expansion, to cost more than $40,000.

Department of Water Supply, Gas and Electricity, Municipal Building, New York, has plans for pumping plant at Gravesend Bay, Brooklyn, to cost about $140,000 with machinery. Mortimer D. Metcalfe, Bedford and Atlantic Avenues, Brooklyn, is architect.

White Plains Iron Works, Inc., White Plains, N. Y., has taken over property at North White Plains and will soon begin production, specializing in ornamental cast and wrought iron products.

Shampan & Shampan, 188 Montague Street, Brooklyn, architects, have filed plans for two-story automobile service, repair and garage building, 100 x 125 ft., at Long Island City, to cost about $175,000 with equipment.

Pioneer Instrument Co., 754 Lexington Avenue, Brooklyn, has awarded general contract to R. J. Murphy, 1841 Broadway, New York, for extensions and improvements in factory, to cost about $45,000 with equipment.

Brandes Products Corporation, 200-14 Mount Pleasant Avenue, Newark, manufacturer of radio equipment and parts, has leased space in new building at 56-60 Earl Street for expansion, transferring engineering department to that location and releasing space in main factory for increased production.

Raritan Copper Works, foot of Elm Street, Perth Amboy, N. J., is carrying out an expansion program to cost more than $125,000, including addition to billet mill to cost $55,000; extension, 70 x 176 ft., to furnace building; addition to tank house generator unit; new pumping station and other work.

Board of Education, Millburn, N. J., is said to be planning installation of manual training equipment in addition to high school, to cost about $400,000. Guilbert & Betelle, 24 Branford Place, Newark, are architects.

Beaver Mfg. Co., 625 North Third Street, Newark, manufacturer of electrical wiring devices and equipment, has plans for a two-story addition, to cost about $40,000 with equipment. Marshall

N. Shoemaker, 15 Central Avenue, is architect and engineer.

Mott & McElrath Engineering Corporation, 249 West Eighteenth Street, New York, has been appointed representative in metropolitan district by Orton Crane & Shovel Co., Chicago. Servicing will be done and spare parts will also be handled.

Petty & Wherry, 50 Church Street, New York, power transmission equipment, have purchased Coleman Power Transmission Co. of Brooklyn, which it will continue in operation.

American Can Co. has moved its New York offices from 120 Broadway to 230 Park Avenue.

Newark Galvanizing Co. has opened its new plant at 39 Verona Avenue, Newark, which will be devoted exclusively to hot-dip galvanizing. Although specializing in large work, small jobs will also be handled. Company is a subsidiary of Atlas Fence Co., same address. Frank C. Zuch is president of galvanizing company and Theodore Hayes, general manager. Latter was recently with Staten Island Shipbuilding Co., and when it was merged as a unit of United Drydock Co., he and some associates helped organize Newark Galvanizing Co.

Buffalo

BUFFALO, April 15.—In connection with recent purchase of substantial interest in Landon Radiator Corporation, North Tonawanda, N. Y., Crane Co., Chicago, is arranging for increased production of this line, and will provide facilities at plants at Chicago and Bridgeport, Conn.

John F. Donovan, Auburn, N. Y., city manager, will receive bids until April 30 for one 180-hp. vertical shaft hydraulic turbine; one 156-kva. vertical type electric generator, switchboard, electrical control apparatus, etc., for municipal power plant. Arthur J. Adams is chief engineer and superintendent.

Curtiss Aeroplane & Motor Co., Kail Street, Buffalo, has purchased Albert Reed Propeller Co., manufacturer of aircraft propellers, and will consolidate. Expansion is planned.

R. G. Kittinger Shops, Inc., North Tonawanda, N. Y., recently formed by Ralph G. Kittinger, 234 Depew Avenue, Buffalo, and associates, with capital of $1,000,000, to manufacture furniture, has begun work on first unit of new plant, one story, 90 x 600 ft. Work will soon begin on other buildings, including another manufacturing unit and power plant. Entire project will cost about $300,000 with machinery. Frederick J. Batson, Buffalo, is also interested in new company.

Officials of American-LaFrance & Foamite Corporation, Elmira, N. Y., and Republic Motor Truck Co., Inc., Alma, Mich., are organizing company to take over and consolidate commercial truck division of first-noted company and properties of latter concern, including its subsidiaries, Linn Mfg. Corporation, Morris, N. Y., manufacturer of farm and road tractors, Detroit Patents Holding Co., Detroit, and Republic Truck Sales Corporation. It is proposed to discontinue present commercial truck plant of American-LaFrance company at Bloomfield, N. J., removing to Alma, where production will be concentrated.

Plans have been arranged for merger of 1900 Washer Co., Binghamton, N. Y., and Upton Machine Co., St. Joseph, Mich., both manufacturers of electric washing machines and parts. It is proposed to maintain production at both plants and increase output.

Gisholt Machine Co., Madison, Wis., has appointed Arnold S. Beckman, 850 Potomac Avenue, Buffalo, direct representative in charge of sales and service in western New York. This appointment is in accordance with company's policy of having direct representation wherever possible.

New England

BOSTON, April 15.—Extended deliveries are having an effect on machine-tool sales. Some dealers report business practically at a standstill, while others have taken orders for delivery in July and earlier.

An advance in at least one line of milling machines, amounting to about 15 per cent, has in no way checked inquiries for such tools. What users are willing to pay for good used tools and what dealers are asking resulted in some falling off in sales the past week. Combined sales of both new and used tools were considerably less than in the preceding week.

New England machine-tool builders report some falling off in new business, but most of them are well booked ahead for both domestic and foreign delivery.

Western Electric Co., Chicago, has ordered four wire machines from Wire Machinery Co., New Haven, Conn. They will have an aggregate weight of 1,300,000 lb., cost more than $500,000, and will be a year and a half in making.

D. R. Campbell Machine Co., Mildred Avenue, Dorchester district, Boston, has awarded a contract for a one-story shop, 40 x 60 ft.

Plans are in progress for a one-story, 36 x 50 ft., machine shop for Norlander Machine Co., 463 South First Street, New Bedford, Mass. Arthur L. Lucas, Smith Mills, North Dartmouth, Mass., is architect.

American Galvanizing Co., 83 Florence Avenue, Revere, Mass., has started work on a one-story plant, 50 x 100 ft.

Washburn Wire Works, Bourne Avenue, East Providence, R. I., has awarded general contract to J. W. Bishop Co., Providence, for one-story addition, to cost about $25,000 with equipment.

Judson L. Thompson Mfg. Co., Waltham, Mass., manufacturer of tubular rivets, rivet-setting machines, etc., has taken bids on general contract for one-story addition, 100 x 200 ft., to cost about $85,000 with equipment. A. F. Gray, 53 State Street, Boston, is architect.

Boston & Maine Railroad Co., North Station, Boston, has plans for a new engine house, with machine shops, power house, mechanical washing building and other units at Somerville, Mass., to cost about $1,000,000 with equipment.

Petroleum Heat & Power Co., Stamford, Conn., manufacturer of oil burners and oil burner equipment, has arranged for merger with American Nokol Co., 4200 Schubert Avenue, Chicago, manufacturer of similar products, under first-noted name. Production will be concentrated largely at Stamford, where former plant of Stollwerck Chocolate Works on 12-acre tract, adjoining plant of Petroleum Heat company, has been acquired. Part of land will be used for oil storage and distributing plant, with capacity of 15,000,000 gal. Entire project will cost close to $1,000,000. W. C. McTarnahan is president.

Bristol Co., Platts Mills, Waterbury, Conn., manufacturer of recording and measuring instruments, has plans for one-story addition, to cost about $50,000 with equipment. F. A. Webster, 51 West Main Street, is architect.

Philadelphia

PHILADELPHIA, April 15.—Contract has been let by E. G. Budd Mfg. Co., Twenty-fifth Street and Hunting Park Avenue, Philadelphia, manufacturer of steel automobile bodies, to Wark Co., 1600 Walnut Street, for one-story addition, to cost about $40,000 with equipment.

Bendix Brake Service Co., 3912 North Broad Street, Philadelphia, automobile brakes and equipment, a subsidiary of Bendix Brake Co., South Bend, Ind., will take bids at once for two-story and basement factory branch, service and repair building, 75 x 175 ft., to cost $150,000 with equipment. H. G. Christman, 306 Notre Dame Avenue, is engineer.

Shaw & Lynch, Inc., Philadelphia, recently formed by Edward A. Lynch, 2322 South Twenty-first Street, and Henry M. Shaw, plan operation of local plant for manufacture of tools and hardware specialties.

Philadelphia & Reading Coal & Iron Co., Reading Terminal, Philadelphia, is disposing of bond issue of $30,800,000, a considerable part of fund to be used for expansion and improvement, including two new centralized electric-operated coal breakers in eastern Pennsylvania, electrification of mining properties, and construction of steam-operated electric generating plant at Herndon. A. J. Maloney is president.

Borough Council, Lansdale, Pa., is considering construction of a municipal electric light and power plant, to cost over $125,000 with equipment. Nelson Krieble is secretary, in charge.

Acosta Aircraft Corporation, Trenton, N. J., is preparing for production on capacity basis in part of former local plant of Mercer Automobile Co., recently leased, and will give over about 50,000 sq. ft. floor space to manufacture of four-passenger all-metal airplanes of 180 hp. motor capacity. A like amount of floor space at plant will be placed in service for other aircraft manufacture. Company has arranged for stock issue to total $3,400,000, part of proceeds to be used for new plant and production. Bertrand B. Acosta is president.

De Laval Steam Turbine Co., North Clinton Avenue, Trenton, N. J., has work under way on addition to cost over $65,000 with equipment for which general contract recently was let to John W. Ferguson Co., Paterson, N. J.

West Mountain Coal Co., Jermyn, Pa., is considering rebuilding coal breaker partially destroyed by fire April 9.

Oliver United Filters Co., Hazleton, Pa., manufacturer of filtering machinery, with branch plant at Oakland, Cal., is said to have plans for another Pacific Coast plant at Fruitvale, Cal., to cost about $400,000 with equipment.

E. Lane Crawford, 509 Swede Street, Norristown, Pa., architect, has plans for one-story automobile service, repair and garage building, to cost about $100,000 with equipment.

Detroit

DETROIT, April 15.—Contract has been let by Ex-Cell-O Tool & Mfg. Co., 1469 East Grand Boulevard, Detroit, to Austin Co. for one- and two-story addition, 75 x 185 ft., to cost about $80,000 with equipment.

Sterling Ice Co., Dowagiac, Mich., will take bids in about 30 days for one-story addition to cost about $50,000 with equipment.

Beebe Boat Works, Inc., Port Huron, Mich., recently formed by Jack Beebe, Port Huron, and associates, has leased former local plant of Walker Electrical Refrigeration Co., now property of Bohn Aluminum & Brass Corporation, Detroit, for new plant to manufacture motor boats and other craft.

Detroit Wax Paper Co., 547 Harper Street, Detroit, will erect one-story plant, 200 x 600 ft., at River Rouge, where 6-acre tract recently was acquired, to cost $500,000 with machinery.

Richard Brothers Die Works, 4646 Lawton Avenue, Detroit, has awarded general contract to Austin Co. for one-story unit, 100 x 205 ft., to cost about $100,000 with machinery.

Following recent affiliation with Anaconda Wire & Cable Co., 25 Broadway, New York, as unit of that organization, Maring Wire Co., Muskegon, Mich., has filed plans for one-story unit, to cost about $75,000 with equipment.

Marvel Carburetor Co., Flint, Mich., has let general contract to W. E. Wood Co., Ford Building, Detroit, for one-story addition, to cost about $50,000 with equipment.

Line-O-Scribe, Inc., Adrian, Mich., recently organized to manufacture writing machines for signs, show cards, etc., has taken over former plant of Adrian Airlite Baking Co. and will operate at that location.

Warner Aircraft Co., Detroit, has work under way on initial units of new parts and assembling plant, to cost about $500,000 with equipment. Christian W. Brandt, Kresge Building, is architect.

Use-All Welder Point Co., 13,518 Plymouth Road, Detroit, has been incorporated to manufacture a patented spot welder point. Manufacturing will be done on contract basis. H. R. Shaffer is secretary.

Electro Chemical Pattern & Mfg. Co., 3975 Beaufait Avenue, Detroit, will erect a one-story addition, 30 x 70 ft., to increase its electrolytic copper plating facilities.

Pittsburgh

PITTSBURGH, April 15.—Machine-tool business lags somewhat, compared with the first two months of the year, but is considered satisfactory, particularly from the standpoint of new inquiries. Railroad business is active and Pittsburgh dealers are interested in lists which have been issued by the Delaware, Lackawanna & Western and the Chesapeake & Ohio. The list of the latter road, which is the second issued recently, includes about a dozen items. The Westinghouse Electric & Mfg. Co., is beginning to buy against its second quarter list, but other business is made up largely of miscellaneous small orders.

The Neville Island development of the Davison Coke & Iron Co. will probably require a number of machine tools, but no inquiry has yet been issued.

Work will soon begin by Jones & Laughlin Steel Corporation, on storage and distributing plant, 120 x 430 ft., at Memphis, Tenn., to cost more than $200,000 with equipment. Gardner & Howe, Porter Building, Memphis, are architects.

Wilson-Snyder Mfg. Co., Braddock, Pa., manufacturer of pumps, parts, etc., has plans for one-story machine shop, 60 x 130 ft., to cost about $60,000 with equipment.

Pittsburgh Plate Glass Co., Frick Building, Pittsburgh, is said to have plans nearing completion for new sheet glass manufacturing plant at Henryetta, Okla., to cost about $2,000,000 with equipment. Company is also considering new plant near Santa Ana, Cal., to cost about like sum. For this and other expansion, company has a fund of $10,881,000, previously authorized and not as yet expended, and has recently increased this by an additional appropriation of $2,708,669.

Westinghouse Electric & Mfg. Co., East Pittsburgh, will soon take bids on general contract for one-story addition, 60 x 160 ft., to cost about $100,000 with equipment. Bernard H. Prack, Martin Building, is architect.

Standard Automatic Products Corporation, Corry, Pa., recently organized by C. F. Bliss, Corry, and associates, plans operation of local plant to manufacture mechanical metal goods, including airplane and automobile parts. Henry E. Fish, Erie, Pa., is interested in new company.

Industrial Brownhoist Corporation, Cleveland, on April 20 will move its Pittsburgh office from Oliver Building to Koppers Building. L. Kleinhans will continue in charge.

South Atlantic

BALTIMORE, April 15. — Arrangements have been made by Fairchild Aviation Corporation, 270 West Thirty-eighth Street, New York, an interest of Aviation Corporation, same address, for purchase of controlling interest in Kreider-Reisner Aircraft Co., Hagerstown, Md., and will operate as unit of organization. Plans have been approved for one-story addition to Hagerstown plant, to increase capacity from 110 to 465 complete airplanes per annum.

U. C. Wimbrow, Salisbury, Md., has plans for two-story automobile service, repair and garage building, 204 x 215 ft., to cost more than $100,000 with equipment.

Ever Ready Cap Co., East Street, Frederick, Md., manufacturer of metal bottle caps and capping machinery, has awarded general contract to Hahn & Betson for two-story addition, to cost about $40,000 with equipment.

Board of District Commissioners, District Building, Washington, will receive bids until April 30 for 1000 water meters.

Board of Trustees, University of Maryland, Baltimore, has engaged Smith & May, Calvert Building, architects, to prepare plans for new central power plant, to cost about $180,000 with equipment. Same architects will also prepare plans for three-story addition to engineering building, to cost $100,000 with equipment.

New cold storage and refrigerating plant of Crozet Cold Storage Co., Crozet, Va., referred to last week, will be first unit of project and is scheduled for completion in July. Closely following, work will begin on second five-story unit, 100 x 120 ft., to cost an additional $200,000 with machinery. General contract for first building has been let to John P. Pettyjohn Co., Lynchburg, Va.

Virginia Electric & Power Co., Richmond, Va., is arranging for increase in capital from 100,000 to 580,000 shares of stock, no par value, part of fund to be used for extensions.

Glenn L. Martin Co., Leland and Ponca Streets, Baltimore, manufacturer of airplanes, has awarded general contract to Hughes-Foulkrod Co., Schaff Building, Philadelphia, for initial unit of plant on 1000-acre tract near city, one story, 300 x 933 ft., for parts production and assembling, to cost $1,000,000 with machinery. Philip L. Small & Associates, Terminal Tower Building, Cleveland, are architects and engineers.

Construction Quartermaster, Bolling Field, Washington, has been authorized to build a two-story mechanical field shop at airport, to cost $60,000 with equipment; also a new steam power plant to cost $50,000.

General Fire Extinguisher Co., 248 North Highland Avenue, Atlanta, is asking bids on general contract until April 22 for addition to local factory branch, storage and distributing plant, to cost over $75,000 with equipment. Lockwood Greene Engineers, Inc., Wilson Building, Charlotte, N. C., is architect and engineer. Company is subsidiary of Grinnell Co., Inc., Providence, R. I.

Cleveland

CLEVELAND, April 15.—Machine-tool sales the past week continued fairly good, being about the same volume as in the previous week, but not so heavy as in March. Few orders were for more than single machines. Turret lathes continue in heavy demand. One local maker reports its volume of orders so far this month equal to those during the corresponding period in March. Machine-tool deliveries are becoming more deferred, one maker not promising shipments before October and November on some sizes. As a result of deferred deliveries on new equipment, used machinery is in good demand.

Central Alloy Steel Corporation, Massillon, Ohio, has acquired plant of American Stamping & Enameling Co., Massillon, at receivership sale, to manufacture alloy steels for which it recently secured a license from Krupp interests in Germany.

Cleveland Welding School will shortly move to larger quarters at 2261 East Fourteenth Street, where it will operate 20 assembly and welding units, five cutting units and four electric arc welders.

Contract has been let by Metal Equipment Co., 2035 West 106th Street, Cleveland, for two-story plant, 60 x 125 ft., to cost about $60,000 with machinery.

Ohio Electric & Controller Co., 5900 Maurice Avenue, S. E., Cleveland, manufacturer of lifting magnets, motors, etc., is erecting two-story addition, to cost about $70,000 with equipment.

Transue & Williams Steel Forging Co., Alliance, Ohio, is planning an expansion and improvement program to cost more than $500,000.

Union Cap Screw Co., Union Avenue, Cleveland, is completing plans for a one-

story machine shop, 60 x 75 ft., to cost about $35,000 with equipment.

Standard Envelope Co., 1600 East Thirtieth Street, Cleveland, has awarded general contract to Uhl-Jaster Co., 2341 Carnegie Avenue, for one-story addition, 80 x 115 ft., to cost about $45,000 with equipment.

American Steel Foundries Co., 410 North Michigan Avenue, Chicago, is planning an expansion program at branch plant at Alliance, Ohio, and will install additional equipment for production of steel car wheels. A fund of about $500,000 has been arranged for work.

John S. Moore, Steubenville, Ohio, operating Fort Steubenville Flying Field, has organized new company with capital of $100,000 to manufacture airplanes. Work will soon begin on one-story plant at Brilliant, near Steubenville, to cost about $50,000 with equipment.

Cleveland Stone Co., Cleveland, subsidiary of which is Sterling Grinding Wheel Co., has merged with Ohio Quarries Co., and will operate under name of Cleveland Quarries Co.

Variety Iron & Steel Works Co., East Fortieth Street and Hamilton Avenue, Cleveland, is liquidating its iron and steel fabricating equipment through B. D. Holt, receiver.

Toledo Scale Co., Toledo, Ohio, has purchased an 80-acre tract near Toledo Terminal Railroad and New York Central tracks and will erect factory buildings containing 280,000 sq. ft. of floor space. Construction contracts will be awarded immediately and plant is scheduled for occupancy by January, 1930.

Chicago

CHICAGO, April 15.—Orders for machine tools in this district continue steady, and new inquiry promises a sustained rate of buying. Some dealers report heavier sales in the first half of April than in the corresponding days of March. A few orders have been placed against the list of the Pullman Car & Mfg. Corporation. Railroad interest is generally dull, but indications are that the Rock Island will soon place orders against quotations recently received. A supplementary list will soon be issued by the International Harvester Co. for its Fort Wayne plant.

Prices generally are strong and dealers are expecting announcements of higher quotations on shapers. The used tool market is active. Sealed bids are being asked of dealers for the machine tool equipment for the Velie Motors Corporation, Moline, Ill.

Harrison Radiator Cover Co., 4221 West Kinzie Street, Chicago, has bought factory at 1418 West Fifth Avenue from Standard Stamping & Perforating Co. Standard company will erect a new plant on a site to be selected.

Clarence E. Frazer, architect, 64 West Randolph Street, Chicago, has awarded contract for a one-story machine shop, for an unnamed owner, 75 x 125 ft., to cost $30,000. Same architect is completing plans for a one-story machine shop on West Lake Street, 45 x 85 ft., to cost $15,000.

Quality Hardware & Machine Co., 5845 Ravenswood Avenue, Chicago, will build a one-story shop, 75 x 100 ft., to cost $20,000.

Wahl Clipper Corporation, East Third Street, Sterling, Ill., will build a two-story factory, lower floor to be used as a machine shop.

Property at 3711-15 North Clark Street, Chicago, 75 x 100 ft., has been purchased by Evans Flexible Reamer Co., 3513 Lincoln Avenue, as site for new three-story plant, to cost over $70,000 with equipment.

Northern States Power Co., 15 South Fifth Street, Minneapolis, is said to have plans for new steam-operated electric generating plant at Fargo, N. D., to cost more than $700,000 with equipment. Byllesby Engineering & Management Corporation, 231 South La Salle Street, Chicago, is engineer.

Minnesota & Ontario Paper Co., Builders' Exchange, Minneapolis, will soon begin superstructure for a one-story mill addition at International Falls, Minn., to cost more than $200,000 with equipment.

Joslyn Mfg. & Supply Co., 120 South La Salle Street, Chicago, manufacturer of bolts, insulators and kindred products, has asked bids on general contract for one-story plant at Franklin Park, Ill., to cost about $80,000 with equipment. R. Harold Zook, 140 South Dearborn Street, Chicago, is architect.

Board of Education, School District No. 1, Pueblo, Colo., has approved plans for two-story and basement industrial arts school, 40 x 90 ft., to cost about $35,000. Charles E. Thomas, First National Bank Building, is architect.

Olive Can Co., 450 North Leavitt Street, Chicago, has awarded general contract to Goldberg & Fisher, 3057 North Troy Street, for one-story addition, 45 x 120 ft., to cost about $30,000 with equipment. G. E. Pearson, 4000 West North Avenue, is architect.

J. F. Decker & Sons, Inc., Mason City, Iowa, meat packer, will take bids on general contract early in May for four-story addition, 137 x 205 ft., to cost about $350,000 with equipment. Henschien & McLaren, 1637 Prairie Avenue, Chicago, are architects and engineers.

Northern Pacific Railway Co., Railroad Building, St. Paul, Minn., is planning extensions and improvements in engine house and repair shops at Duluth, Minn., to cost about $50,000 with equipment. O. M. Rognan is company architect.

Reynolds Engineering Co., Fifth Avenue and Thirty-eighth Street, Rock Island, Ill., is completing an addition to its plant, 50 x 106 ft., which will double present capacity. Company manufactures tools and jigs and does general machining work.

The Crane Market

INQUIRY for electric overhead cranes continues active, but is limited in most cases to single cranes. The list of 10 overhead cranes, for which the Nichols Copper Co., Brooklyn, has been inquiring, has been awarded to the Milwaukee Electric Crane & Mfg. Corporation. Two overhead crane contracts recently placed are reported to have been awarded to the Maine Electric Co. The Baltimore & Ohio Railroad has not yet closed on a 10 and 15-ton crawl-tread cranes, but has bought a 50-ton standard locomotive crane and two large wrecking cranes.

Among recent purchases are:

John J. Cavagnaro, Harrison, N. J., 10-ton, 24-ft., 8-in. span, overhead electric crane from an unnamed builder.

International Cement Corporation, New York, a bucket crane for export to Cuba from an unnamed builder.

American Smelting & Refining Co., Maurer, N. J., two 10-ton bucket cranes reported from Maine Electric Co.

New York Edison Co., New York, overhead crane to handle wet ashes in 3 cu.-yd. bucket at Fourteenth Street power station, reported from Maine Electric Co.

Baltimore & Ohio Railroad, Baltimore, 50-ton locomotive crane and two wrecking cranes from Industrial-Brownhoist Corporation.

Nichols Copper Co., Laurel Hill, Long Island, ten 5 and 15-ton overhead cranes from Milwaukee Electric Crane & Mfg. Corporation and two 7½-ton charging machines from Morgan Engineering Co., all for El Paso, Tex.

Carnegie Steel Co., Mingo works, Mingo Junction, Ohio, one 125-ton ladle crane from Alliance Machinery Co.

St. Louis

ST. LOUIS, April 15.—Bids have been asked by Kroeger Grocery & Baking Co., 3801 Vista Avenue, St. Louis, for one-story motor truck machine and repair shop, including service garage and storage unit, 105 x 360 ft., to cost more than $125,000 with equipment. Emil H. Niemann, 3816 Shaw Avenue, is architect.

Beacon Airways of America, Inc., Board of Trade Building, Kansas City, Mo., has plans for airplane buildings in Fairfax industrial district, Kansas City, Kan., including one-story repair shop, to cost about $85,000 with equipment. C. E. Shepard, Huntzinger Building, Kansas City, Mo., is architect.

Railways Ice Co., Kansas City, Kan., has superstructure under way for one-story ice-manufacturing plant, 158 x 200 ft., to cost more than $125,000 with equipment.

Blue Valley Foundry Co., 7019 Twelfth Street, Kansas City, Mo., has filed plans for one-story foundry, 50 x 70 ft., to cost about $18,000 with equipment.

Red Wing Commercial Aircraft Co., St. Joseph, Mo., is planning new one-story plant unit near municipal airport, to cost about $40,000 with equipment. Carl H. Wolfley, vice-president, is in charge.

Western States Utilities Co., Central City, Neb., has plans for new power house at Elgin, Neb., to cost about $45,000 with equipment. An ice-manufacturing plant is also planned at same location. J. P. Helleberg, Kearney, Neb., is architect.

Wackman Welded Ware Co., 2412 South Seventh Street, St. Louis, has awarded general contract to J. R. Forner Construction Co., Ritz Building, Tulsa, Okla., for one-story and basement plant, 50 x 200 ft., at Sand Springs, Okla., to manufacture steel barrels to cost about $65,000 with equipment. Louis B. Wackman is president.

A. B. Chance Mfg. Co., Centralia, Mo., manufacturer of telephone equipment, plans rebuilding part of storage and distributing plant destroyed by fire, April 9.

Coleman Lamp Co., 238 St. Francis Street, Wichita, Kan., has awarded general contract to John Denny, 1451 North Lawrence Street, for four-story and basement addition, 60 x 160 ft., to cost about $85,000 with equipment.

Eagle Laundry Machinery Co., St. Louis, manufacturer of laundry and drying equipment, has moved from 31 St. George Street to 111 South Second Street, and increased floor space from 8000 to 35,000 sq. ft.

Halpin-Kohlbry, Inc., 29 South Fourth

Street, St. Louis, has purchased new warehouse and office building at 4116 Clayton Avenue and will move to new location. Company handles steel, tools, machinery, welding and industrial heating equipment.

Eagle Picher Lead Co., Railway Exchange Building, St. Louis, will install additional furnace equipment and one-story sheet lead mill, costing about $275,000, at Galena and Smelter Hill, Mo.

Trav-ler Mfg. Co., Harold J. Wrape, president, manufacturer of self-contained portable radio sets, has moved from Chicago to factory at 1818 Washington Avenue, St. Louis, containing about 3600 sq. ft.

United Products Co., 1013 Russell Boulevard, St. Louis, has been organized with H. J. Miller, president, to manufacture sheet metal specialties, transformers, ammeters, photographers' and violet-ray lamps, and will occupy 9000 sq. ft. of floor space.

Milwaukee

MILWAUKEE, April 15.—Machine-tool business so far this month is about equal to that of the corresponding period in March. Shortage of labor for machine tool and other shops and foundries is restricting production somewhat. Local industries are still buying new equipment at a high rate.

Teleoptic Corporation, Milwaukee, has been incorporated with $150,000 preferred stock and 45,000 common shares without par value to manufacture electrical signal devices designed by B. L. Bobroff, 378 East Capitol Drive. Principal product will be an automatic device for transmitting messages in hospitals, hotels, ships, etc. Plant will be established either in Milwaukee or Racine. Herbert F. Johnson, Racine, is president; Julius Leiser, Milwaukee, secretary, and George Tromvig, Racine, treasurer. Mr. Bobroff is vice-president.

Edison Wood Products, Inc., New London, Wis., division of Thomas A. Edison industries, will build a three-story factory addition, 50 x 150 ft., to increase output of phonograph and radio cabinets. J. J. Burns is general manager.

Kohver Pattern Co., 1656 Second Street, Milwaukee, manufacturer of wood and metal patterns, has broken ground for a one-story addition, 50 x 104 ft. New machinery for metal department will be purchased.

Allis Automatic Screw Products Co., 5414 Burnham Street, West Allis, Milwaukee, has placed general contract with Martin Jezo, 597 Fifty-first Avenue, for a machine shop addition, 40 x 106 ft., one-story and part basement.

Hutter Construction Co., 128 Western Avenue, Fond du Lac, Wis., has general contract for a four-story addition, 121 x 236 ft., for Hazel-Atlas Glass Co., Washington, Pa. It will cost about $250,000.

Prentice-Wabers Mfg. Co., Wisconsin Rapids, Wis., manufacturer of camp cook stoves, furniture, etc., has started work on an addition costing $25,000, and new office building and warehouse costing $20,000. Ralph Wiltrout is general manager.

Common Council, Oshkosh, Wis., has instructed board of public works to prepare plans for a new four-unit garbage incinerating plant to cost about $60,000. Emma Hebel is city clerk.

Triplex Lawn Mower Co., Platteville, Wis., plans addition to factory and installation of considerable new equipment to handle five-year contract with Chicago company for major share of output.

Controlling interest in Lake Shore Engine Works, Marquette, Mich., formerly held by Longyear Estate, has been acquired by Milwaukee, Detroit and Iron Mountain, Mich., business men for $170,000. Milwaukee men interested are Charles L. Coughlin, president, Evinrude Motor Co. and vice-president and general manager, Briggs & Stratton Corporation; Eugene W. Krueger, president, and William E. Kinsella, vice-president, Worden-Allen Co.

Cutler-Hammer, Inc., Milwaukee, manufacturer of electrical control devices, has leased space in a warehouse at East Ninth Street and Hamilton Avenue, Cleveland, for quick deliveries of products in Cleveland territory, embracing Ontario, western New York, western Pennsylvania, part of Maryland, all of West Virginia and Ohio, and sections of Indiana, Tennessee and Kentucky. A. G. Pierce is manager of Cleveland district, which maintains branch offices in Buffalo, Pittsburgh and Cincinnati.

Cincinnati

CINCINNATI, April 15.—Machine-tool bookings have been holding up well this month, although the volume is somewhat less than in March. Inquiries are numerous and indicate liberal buying in the next 30 days. Scattered orders are being received from automobile companies, but business from this source has fallen off considerably. Current sales are well distributed throughout the United States and to industries using machine tools.

Foreign orders have contributed substantially to recent bookings of at least two important builders, most of the business having come from Soviet Russia and from European countries. Production in local shops continues at capacity with no abatement of output expected in the near future.

Contract has been let by National Cash Register Co., Dayton, Ohio, to H. R. Bragg Co., 1229 East Third Street, for six-story and basement addition, to cost $600,000 with equipment.

Rendigs, Panzer & Martin, 519 Main Street, Cincinnati, architects, have plans for three-story automobile service, repair and garage building, 40 x 175 ft., to cost about $300,000 with equipment.

Tennessee Aircraft Corporation, Chattanooga, Tenn., recently formed by Bradley Betterton, Chattanooga, and associates, is planning establishment of flying school, with one-story machine and repair shop and other mechanical buildings.

City Council, Paris, Tenn., is considering construction of municipal electric light and power plant, to cost more than $70,000 with machinery.

Oliver Farm Equipment Co., South Bend, Ind., has purchased plant and business of American Seeding Machine Co., Springfield, Ohio, and will consolidate. Springfield plant will be continued in service.

Spang, Chalfant & Co., Inc., Clark Building, Pittsburgh, has awarded general contract to James Hamilton, 1996 Higbee Street, Memphis, Tenn., for one-story factory branch and distributing plant, 105 x 160 ft., at Memphis, to cost about $90,000 with equipment.

Southern Textile Machinery Co., Norton and Second Streets, Paducah, Ky., is said to be planning new branch plant at Nashville, Tenn., to manufacture textile mill machinery, to cost about $45,000 with equipment.

Crosley Radio Corporation, Cincinnati, has acquired 200,000 sq. ft. adjoining its plant and will erect a building for assembling and loading, to cost about $500,000.

Gulf States

BIRMINGHAM, April 15.—Plans have been filed by American Can Co., North Cortez Street, New Orleans, for addition to plant, 80 x 220 ft., including improvements in present factory, to cost about $300,000 with equipment. H. L. Wheeler is local manager. Headquarters are at 120 Broadway, New York.

Art-Ways System, Inc., Gunter Building, San Antonio, Tex., Claude Birkhead, in charge, has taken over property at North St. Mary and Dallas Streets, and will establish plant to manufacture advertising novelties and specialties.

R. J. Moore, Kantor Building, Greenwood, Miss., architect, has plans for one-story automobile service, repair and garage building, 100 x 160 ft., to cost about $100,000 with equipment.

Reed Roller Bit Co., Houston, Tex., manufacturer of oil well drilling and other equipment, has purchased 10-acre tract adjoining for expansion. Company is said to be planning construction of one-story unit for drop forge and kindred production.

Texas-Louisiana Power Co., Fort Worth, Tex., has approved plans for one-story electrically-operated ice-manufacturing plant at El Paso, Tex., to cost about $70,000 with equipment.

City Council, Lubbock, Tex., is arranging purchase of 600-acre tract for municipal airport, and plans construction of hangars, repair shop, oil storage and other buildings, to cost about $75,000.

General Tire & Rubber Co., Akron, Ohio, is said to have selected site near Birmingham for tire and tube mill, to cost over $2,000,000 with machinery.

Duval-Texas Sulphur Co., Corpus Christi, Tex., has authorized extensions and improvements in sulphur mining plant to double present capacity; power plant will also be increased. Port facilities at Corpus Christi will be developed for shipping, including installation of conveying, loading and other handling equipment. Plans have been approved for construction of railroad to mining properties. Company is subsidiary of United Gas Co., Houston, Tex.; George F. Zoffman, mining engineer, is manager.

Neal-Lucey Co., 60 North Hamilton Street, Houston, Tex., has plans for one-story machine shop and foundry to cost about $25,000 with equipment.

Shell Union Oil Co., Shell Building, St. Louis, has superstructure under way for units for new oil refinery at Deer Park, Houston, Tex., to cost over $5,000,000 with machinery.

Fisk Tire Co., Chicopee, Mass., has leased new building, 100 x 100 ft., to be erected at Tampa, Fla., for new factory branch and distributing plant, to cost about $80,000 with equipment. Building award has been made to G. A. Hanson, Inc., Tampa. Frank Dunham, Wallace Building, Tampa, is architect.

Board of Trustees, Reynolds Presbyterian Orphanage, Dallas, Tex., Roland Martin, treasurer, has plans for a one-

story vocational school, 40 x 90 ft. H. O. Blanding, Corsicana, Tex., is architect.

Purina Mills, Inc., 1521 East Fourth Street, Fort Worth, Tex., has plans for an addition to cereal mill, including elevator, with elevating, conveying, screening and other machinery, to cost $160,000 with equipment.

Indiana

INDIANAPOLIS, April 15.—Mercoid Corporation, 564 West Adams Street, Chicago, manufacturer of automatic control devices, has purchased factory of Laporte Development Co., Laporte, Ind., and will remodel for new plant. Later it is proposed to remove Chicago plant to this location and concentrate production. Entire project will cost over $100,000.

New Indiana Chair Co., Mill and Twelfth Streets, Jasper, has asked bids on general contract for one and two-story plant, 300 x 300 ft., to cost about $100,000 with machinery. A one-story power house, 40 x 40 ft., is proposed. Edwin C. Berendes & Associates, McCurdy Building, Evansville, are architects.

Indianapolis Drop Forge Co., 1300 Madison Avenue, Indianapolis, has taken out permit for one-story addition, 60 x 135 ft., to cost about $25,000 with equipment.

Jasper Chair Co., Jasper, has awarded general contract to Christopher Kanzler & Son, Furniture Building, Evansville, for five new factory units, to cost about $150,000 with machinery; power house will also be built. Fowler & Karges, Furniture Building, Evansville, are architects.

Auburn Automobile Co., Auburn, has purchased former plant of McFarlan Motor Corporation, Connersville, for expansion. Ellis W. Ryan is vice-president, in charge of Connersville plants.

Pacific Coast

SAN FRANCISCO, April 11.—Plans have been filed by Pacific Coast Steel Co., 111 Sutter Street, San Francisco, for one-story storage and distributing plant, 89 x 260 ft., at Los Angeles, to cost about $60,000 with equipment.

Libby, McNeill & Libby, Merchants' Exchange Building, San Francisco, have asked bids on general contract for a one-story addition to canning plant adjoining Fourteenth Street wharf, Oakland, Cal., 520 x 715 ft., part of unit to be equipped for storage and distribution, with mechanical-handling equipment, to cost $250,000. Engineering department of company is in charge.

Union Oil Co., Union Oil Building, Los Angeles, will soon begin work on new refinery at Wilmington, to cost over $1,000,000 with machinery.

Western Air Express, Los Angeles, has plans for hangars, repair and reconditioning shop and other buildings at aviation field on Valley Boulevard, near Alhambra, Cal., to cost more than $75,000 with equipment. A. M. Edelman and A. C. Zimmerman, H. W. Heilman Building, are associated architects in charge.

Midland Counties Public Service Co., Fresno, Cal., is planning expansion in power facilities and transmission lines in San Luis Obispo district, to cost $320,000 with equipment.

Consolidated Steel Corporation, Los Angeles, has purchased Gallagher Co., 6818 Avalon Boulevard, manufacturer of bolted tanks and other bolted-steel products for oil fields, and will merge with organization. Purchase also includes Universal Holding Co., with patents for floating steel roofs for tanks, etc.

Matson & Co., Inc., Selah, Wash., has plans for four-story cold storage and refrigerating plant, 110 x 130 ft., to cost about $130,000 with machinery. John W. Maloney, Yakima, Wash., is architect.

Crown Willamette Paper Co., 248 Battery Street, San Francisco, will begin work this month on extensions and improvements in pulp and paper mill at Camas, Wash., to include new bleached sulphite pulp mill, paper-making unit, converting mill and other buildings, to cost $2,500,000 with machinery.

Pend Oreille Lead-Zinc Co., Old National Bank Building, Spokane, Wash., Lewis P. Larsen, president, is arranging expansion program at its lead and zinc properties at Metaline, Pend Oreille County, Wash., including construction of new concentrating plant, electrolytic zinc mill, with additional power and mechanical operating units. Entire project will cost about $4,000,000 with machinery.

Carter Specialties Co., 902 Hobart Building, San Francisco, is a partnership composed of H. D. Carter and John O. Little. Company is representative in northern California of Wheeling Metal & Mfg. Co., Wheeling, W. Va. Robert C. Oliphant, previously mentioned as a partner, has no interest in firm.

Canada

TORONTO, April 15.—MacLaren Fir Co., Buckingham, Que., has started work on a $15,000,000 power plant on Lievre River at High Falls, Que. R. D. Ferguson, New York, is engineer; W. L. Bishop, Ltd., 10 Cathcart Street, Montreal, has general contract.

Hydro Electric Power Commission of Ontario, University Avenue, Toronto, is having plans prepared for a $6,000,000 power plant at Musquash River, Ont.

Dominion Tar & Chemical Co., Logan Avenue, Toronto, will build a coke plant to cost $18,000, and has awarded general contract to Anglin Norcross, Ltd., 714 Temple Building.

Eclipse Mfg. Co., Argyle Road, Walkerville, Ont., has awarded general contract for a $100,000 manufacturing plant to Christman Burk & Co. O'Dell, Trace & Diehl, Bank of Commerce Building, are architects.

Bryant Pattern & Mfg. Works, 201 Glengarry Avenue, Windsor, Ont., has awarded a number of contracts for a machine and pattern shop, to cost $60,000.

Canadian Goodrich, Ltd., King Street, Kitchener, Ont., has awarded general contract to Dunker Brothers, 48 Louisa Street, for an addition to cost $75,000.

Howard Smith Paper Mills, Ltd., Cornwall, Ont., will build boiler house to cost $20,000, and has awarded contract to Deakin Construction Co., 689 St. Catharine Street West, Montreal.

Toronto Iron Works, Ltd., Cherry Street, Toronto, has completed plans for new plant and will call for bids immediately.

Canadian Pacific Railway Co., J. M. Sullivan, Sudbury, Ont., purchasing agent, will receive bids until April 30 for construction of an engine house at Sudbury to cost $300,000.

City Council, Brantford, Ont., is having plans prepared for a mechanical filtration plant to cost $200,000. Norman R. Wilson is engineer.

Town of Weston, Ont., will build an auxiliary sewage plant to cost $100,000. Tenders will be called immediately. James, Proctor & Redfern, Ltd., 36 Toronto Street, Toronto, is engineer.

Foreign

CONTRACT has been let by Nippon Electric Co., Tokyo, Japan, manufacturer of electrical machinery, to H. K. Ferguson Co., Cleveland, for one-story addition to cost over $200,000 with equipment.

Lever Brothers, Inc., London, England, manufacturer of soaps, etc., has purchased property at Sao Paulo, Brazil, as site for new plant and is said to have plans under way for initial units, to cost over $2,000,000.

Fisk Rubber Co., Chicopee, Mass., manufacturer of tires and tubes, is organizing a subsidiary to operate in Cuba, and plans early establishment of direct factory branch and distributing plant at Havana.

Ipo Mining Co., Bulacan Province, near Manila, P. I., recently formed with capital of 400,000 pesos to operate local gold-mining properties, is considering construction of milling plant near Ipo-Bicti tunnel, close to Angat River, to cost more than 175,000 pesos with machinery. Other mechanical equipment will be installed.

British Suchar Processes, Ltd., London, England, is negotiating with Jamaica Imperial Association, Kingston, Jamaica, for site for new cane sugar mill. Initial plant will have capacity of about 70,000 tons of refined sugar per day, and will include boiler plant, machine shop and other units, to cost over $800,000.

Stores Control Board, New Zealand Government, Auckland, New Zealand, is asking bids until June 28 for wire, metal rods and tubes, fencing, chain, locks and keys, plumbing equipment and supplies, valves, steam cocks, iron goods, etc., covering requirements for several months.

Crown Cork International Corporation, recently organized by officials of Crown Cork & Seal Co., Highlandtown, Baltimore, manufacturer of metal bottle caps, bottle-capping machinery, etc., to establish and operate plants in foreign countries, has arranged for sale of stock to total $3,052,500, a considerable part of fund to be used for plant expansion and acquisition of properties. Company will operate plants in England, Spain, Germany, France, Canada and Brazil. Charles E. McManus is president.

A national management and materials handling meeting will be held at the Book-Cadillac Hotel, Detroit, May 1 to 3. Arrangements now being made for plant visitations include visits to the steel plant of the Ford Motor Co. and to a number of automobile and airplane plants in the Detroit district.

A production engineering meeting of the Society of Automotive Engineers will be held in Cleveland, Oct. 2 to 4.

COMING MEETINGS

April

National Foreign Trade Council. April 17 to 19. Annual meeting, Lord Baltimore Hotel, Baltimore. O. K. Davis, India House, New York, secretary.

National Metal Trades Association. April 24 and 25. Convention, Hotel Drake, Chicago. J. E. Nyhan, Peoples Gas Building, Chicago, secretary.

American Welding Society. April 24 to 26. Annual meeting, Engineering Societies Building, New York. M. M. Kelly, 33 West Thirty-ninth Street, New York, secretary.

Chamber of Commerce of the United States. April 29 to May 3. Annual meeting, Washington.

May

American Society of Mechanical Engineers. May 1 to 4. Management and materials handling divisions, Book Cadillac Hotel, Detroit. Calvin W. Rice, 29 West Thirty-ninth Street, New York, secretary.

Iron and Steel Institute. May 2 and 3. Annual meeting, House of Institution of Civil Engineers, London, England. George C. Lloyd, 28 Victoria Street, London, S. W. 1, secretary.

American Management Association. May 6 to 11. Annual spring convention, Hotel Pennsylvania, New York. W. J. Donald, 20 Vesey Street, New York, managing director.

Exposition of Chemical Industries. May 6 to 11. Twelfth exposition, Grand Central Palace, New York.

American Society of Mechanical Engineers. May 13 to 16. Eastern spring meeting, Sagamore Hotel, Rochester, N. Y.

National Hardware Association of the United States. May 16 and 17. Annual meeting of metal branch, Hotel Statler, Detroit. George A. Fernley, 505 Arch Street, Philadelphia, secretary.

American Gear Manufacturers' Association. May 16 to 18. Thirteenth annual meeting, Hotel Statler, Cleveland. T. W. Owen, 3608 Euclid Avenue, Cleveland, secretary.

American Refractories Institute. May 21 and 22. Annual meeting, French Lick Springs, Ind. Dorothy A. Texter, 2202 Oliver Building, Pittsburgh, secretary.

American Steel and Heavy Hardware Association. May 21 to 23. Twentieth annual convention, Hotel Washington, Washington. B. R. Sackett, 503 Arch Street, Philadelphia, secretary-treasurer.

American Iron and Steel Institute. May 24. Thirty-fifth general meeting, Hotel Commodore, New York. E. A. S. Clarke, 75 West Street, New York, secretary.

American Electrochemical Society. May 27 to 29. Spring meeting, Toronto University, Toronto, Canada. Colin G. Fink, Columbia University, New York, secretary.

American Society of Mechanical Engineers. May 27 to 30. Aeronautic meeting, Hotel Jefferson, St. Louis.

New Trade Publications

Expanded Metal Reinforcing.—Consolidated Expanded Metal Companies, Wheeling, W. Va. Pamphlet of 4 pages illustrating and describing applications of Steelcrete, which is a large-mesh expanded metal product shipped in large sheets, and designed for use in laying a concrete floor directly on the ground. It is pointed out that this will tend to avoid cracking and subsequent deterioration in the floor.

Automatic Electric Control Valves.—Bristol Co., Waterbury, Conn. Catalog 2000 of 20 pages illustrates and describes a line of automatic electric control valves operated by motors or by magnets. They are used for a variety of purposes and may be obtained in any of a number of different forms. Application illustrations show them connected to oil-fired furnaces, etc.

Insulating Material for Traction Apparatus.—General Electric Co., Schenectady, N. Y. Bulletin GEA—991 of 8 pages is devoted to insulation for motors used in railroad and industrial haulage work. Both tape and compounds are covered in the descriptive pages.

Flexible Coupling.—W. H. Nicholson & Co., Wilkes-Barre, Pa. Bulletin 329 of 8 pages illustrates and describes a flexible coupling in which centrifugal force throws the wedge-shaped connecting members outward and thus tightens the grip. There is clearance for misalinement. The couplings are made in 16 sizes, for shafts ranging from 13/16 in. to 12 in. in diameter.

Mechanical Gas Producers.—Wellman-Seaver-Morgan Co., Cleveland. Bulletin 91, 32 pages containing valuable data on producer gas economics, comparisons of producer gas with other fuels, analyses of coals, and a description of Wellman-Seaver-Morgan type L mechanical gas producer with the recently developed Wellman double bell fuel feed.

Riveting Hammers.—Chicago Pneumatic Tool Co., 6 East Forty-fourth Street, New York. Eight-page booklet describing the Boyer riveting hammers. A center page spread showing the construction of the tool features the improved hardened and ground valve unit, which is now furnished on all of these machines.

Transformer Oil.—Wagner Electric Corporation, St. Louis. Bulletin 162 of eight pages, contains complete Wagner transformer oil specifications originally prepared for the organization only, but recently released for transformer buyers and users. The bulletin discusses the purposes of transformer oil, its properties, methods of testing, precautions when handling and storing.

Variable-Speed Transmissions.—Reeves Pulley Co., Columbus, Ind. Booklet of 32 pages bearing the title of "The Modern Need for Infinite Speed Adjustability." Use of the Reeves transmissions in 15 different large manufacturing plants, in connection with conveyors, machine tools and other equipment, is pictured. The device is built in 16 sizes with capacity up to 150 hp., and for floor, wall and ceiling mounting, or for incorporating as an integral part of a machine. Remote control, both electrical and mechanical, as well as handwheel and automatic control can be provided. Engineering data are given in the company's catalog No. T-88.

Ball Bearings.—New Departure Mfg. Co., Bristol, Conn. Engineering data sheet No. 189 FE, showing application of grease lubricated ball bearings to the vertical spindle of a woodworking machine.

Mechanical Handling.—Lamson Co., Syracuse, N. Y. Twelve-page booklet, bound in boards, bearing the title of "Knowledge That Pays Dividends." Use of Lamson conveying equipment in a number of large plants is attractively illustrated and described.

Lubricating Oil.—Alloil Lube Corporation, Broadway Arcade Building, Los Angeles. Pamphlets of eight and 16 pages, describing lubricating oils for both internal combustion engines and steam cylinders, and for general use. Stress is laid upon proper viscosity of each oil developed for each specific purpose.

Milling Machines.—Kearney & Trecker Corporation, Milwaukee. Catalog No. 36, 44 pages, 8 x 11 in., devoted to the company's Duplex, Triplex and Simplex Mil-Waukee-Mil production milling machines, which are made up of a series of standard units that can be combined in various ways to meet both regular and special requirements. Any of the three basic combinations can be furnished in two distinct series, having 14 and 22-in. wide tables and in seven optional table lengths. The number and location of spindles may be specified, and the machines furnished with one pair or a set of pick-off gears, as well as with selective gear boxes. The various units of the machine are clearly illustrated and described and installations are pictured. Specifications and floor plan diagrams are given.

Zinc Products.—New Jersey Zinc Sales Co., 160 Front Street, New York. An eight-page pamphlet describes "Zilloy" which is offered as a non-rusting metal roofing and siding in corrugated and other sheets. Diagrams show the method of application of this material to roofs and side walls.

Multiple-Retort Underfeed Stoker.—Combustion Engineering Corporation, 200 Madison Avenue, New York. Catalog of 14 pages illustrating and describing a type of large stoker for super-station type boiler use. Photographic illustrations show such a stoker under construction, while line drawings indicate its relation to the rest of the boiler, showing two different types of boiler units.

Charcoal Briquets.—Ford Motor Co., Detroit. Two small booklets describe charcoal briquets as made by this company, one dealing with the material as an "ideal fuel for foundry use" and the other discussing the claim that they "burn twice as long as lump charcoal." Both are illustrated.

Alloy Steel Castings.—Sivyer Steel Casting Co., Milwaukee. A four-page leaflet describing properties of certain special alloy steel castings, particularly those for shoes on concrete road-pavers and in equipment for use in the mid-west continent oil fields.